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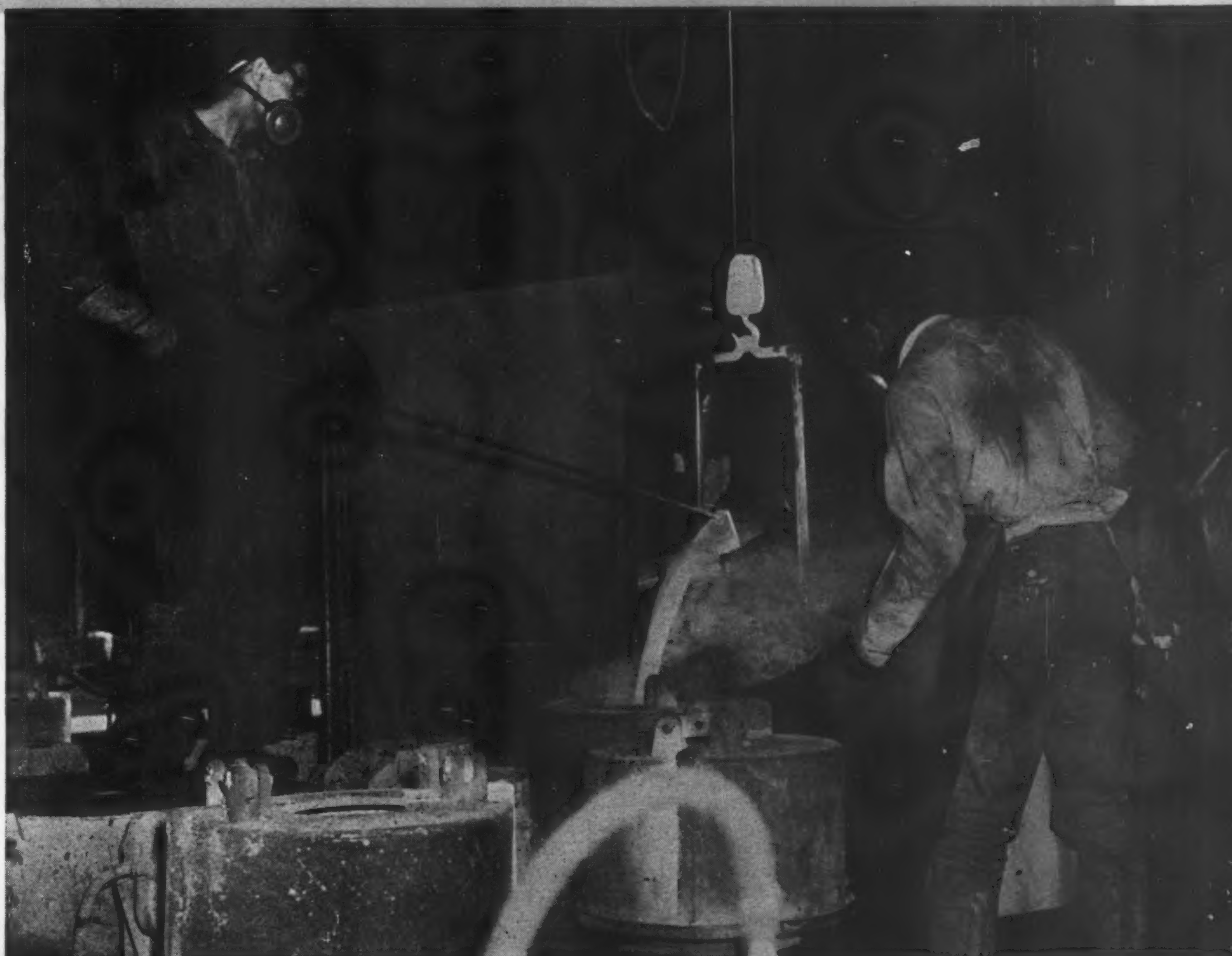
American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES



A Pouring Crew at Work *(Courtesy National Bearing Metals Corp.)*

December 1944

California Offers to Share The Innovations of the West To Create a Greater Industry

PACIFIC COAST foundries have kept pace with the world's fastest airplane and ship building program.

It has been estimated that within the last three years foundries on the Pacific Coast have spent approximately twenty-five million dollars expanding plant facilities, chiefly for the production of airplane and ship castings.

The large scale casting of cylinders and parts for reciprocating engines for the much needed Liberty Ships, the making of the heavy steel stern frames, stern tubes and other large steel castings, and the production and casting of magnesium for the airplane is a record of which Pacific Coast foundries may well be proud.

I should like to take this opportunity to invite all those interested in the development and future of the foundry industry to come to the Pacific Coast when travel is resumed. Come and visit the two friendly California A.F.A. Chapters: the Northern California Chapter, with offices in San Francisco; and the Southern California Chapter, with offices in Los Angeles.

Both of the Chapter Secretaries will be glad to make arrangements for visits to local plants and arrange introductions to the foundrymen of the West. We want you to see for yourself how willing the westerner is to exchange ideas and further develop the foundry industry.

California hopes, in the not too distant future, to make its bid for the A.F.A. Foundry Congress. We would like to share with you the many valuable and interesting innovations that have developed in our area for the war effort, and at the same time we want you to enjoy our beautiful West Coast.

S. D. Russell

SAMUEL D. RUSSELL, *Director*,
American Foundrymen's Association.

SAMUEL D. RUSSELL, whose success in foundry work is indicated by his rise in the Phoenix Iron Works, Oakland, Calif., where he began his career at the age of 12, then transferred from department to department until he merited the position of president of his firm. A National Director of A.F.A., Mr. Russell has taken an active part in Association activities for many years, particularly in the West Coast region. He has served in various capacities as a member of the Northern California Chapter, which he helped to organize and later directed as its chairman.

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The Foundry'

Future Progress

Peter E. Rentschler, President of the Hamilton Foundry and Machine Co., proved a gracious host and efficient tour guide.

The value of quality was stressed to the teachers as they inspected the various gray iron castings.

Watching the Hamilton workers pour the metal into the rows of methodically arranged molds gave an indication of the mass production that is so necessary to our War Effort.

A wide assortment of different types of castings and a detailed explanation of the development processes provided a liberal education for the Hamilton guests.

The teachers in the City School District gleaned a new conception of foundry technique and foundry careers from the interesting plant tour.

AS "NEW" products and processes become bywords in our modern colleges and universities, what is happening to our process, the casting of metals?

Is the same educational value being placed upon the future benefits of a foundry career that is attributed to television, radio, electronics, mining and petroleum, plastics and synthetics, machine trades, welding, optics, and the multitude of others?

As the Government, through the war effort, shows more interest in vocational training, and with the choice of subjects greater than ever before, a selling appeal to the younger generation might be enhanced by a resume of some of the advantages available in a foundry career.

The realization that modern living standards are dependent to an appreciable degree upon the products developed in the foundry field is not recognized on a wide scale. Ignorance, rather than lack of appreciation of a job consistently well done through the years, is principally responsible for this condition, and it is up to metal castings manufacturers to launch an educational program that will promote the status of the industry to the place it deserves in post-war enterprise.

"New Blood" for Industry

To this end, there must be full cooperation among all branches of the field and among all foundrymen. There must be a concentrated crusade to bring "new blood" into the industry . . . there must be a concentrated effort to broaden the possibilities of foundry products so that a foundry career will offer opportunities equal to these "romantic" trends. Actually the romance of the casting industry is as colorful as the evolution of mankind from the "Bronze Age," and the progress that has been made by the industry is constantly apparent in some phase of all the taken-for-granted conveniences of the 20th Century!

Place in the Post-War Sun

Contingent upon "New Blood" for Industry

• Public awakening to modern foundry practice and the value of foundry products to society figure prominently in "selling" foundry careers to the younger generation.

Like so many established industries, the transition from the old to the new in the foundry has been gradual. There has been no heralding of startling innovations or revolutionizing developments in any one period. Rather, as the demands of mankind steadily grew more exacting, the old foundry artisan unobtrusively gave precedence to the modern scientist, so that foundry technique has been able to keep abreast with modern times and adequately supply the needs of modern civilization.

A Mechanized Manufactory

Why, then, do engineering students evince such little interest in foundry work? The answer is all too obvious . . . because so little effort has been expended in "selling" the field as a profitable livelihood!

In addition to the need for publicizing the material benefits to be derived from a foundry career, the fallacy that the foundry is a dirty, unhealthy place in which to work must be convincingly disproved. The idea that the modern foundry still lacks engineering equipment and operates on back-breaking routine must be dispelled.

Would it be possible to develop modern castings with antiquated working equipment and outmoded methods? Could any of the foundries turning out airplane parts, marine fittings, tank assemblies, and the other essential castings for our Armed Forces logically operate under the same conditions as the foundry that turned out pot-bellied wood stoves for our ancestors?

One second of common-sense appraisal of the modern product against the antique, even though both are foundry items, is conclusive evidence that production tech-

Dinner was served in the employees' dining room, and the teachers learned, that Hamilton executives consider pleasant working conditions of primary importance in satisfactory employee relations.

The tour brought the interested visitors into direct contact with the men, enabling them to see that the average foundry employee thoroughly enjoys his work.

All departments were included in the tour, even the storage rooms. This opportunity for an overall inspection of plant operations showed the wide diversification of foundry work.

Following the tour and dinner, the groups assembled for a talk on foundry technique and an explanation of the physical fitness program maintained for the benefit of the Hamilton Foundry and Machine Co. personnel.

The tour entailed more than a superficial inspection, for the competent guides took time to fully explain the various foundry operations.

nique has to conform with modern design. Like all other industries, the foundry field as a whole is a mechanized manufactory and it requires all types of personnel to function properly—scientist, skilled craftsman, labor, and even a small percentage of "white-collar" workers.

Considered as a diversified field of employment, it is well to remember that the market for foundry products never reaches saturation because castings are essential parts or by-parts of practically every item on our warehouse shelves, regardless of whether they are used in some phase of the manufacturing process or actually comprise an integral part of the item itself.

Why, then, with this record of achievement and potential development, should there be any need to feel apprehension over the continued advancement of an industry that is so vital to mankind? This answer, too, is simple—the public in general, because so many foundry products are unapparent on the surface, has little conception of their importance. For example, in purchasing a bathtub, the consumer buys an "enameled" bathtub, giving little or no thought to the casting beneath the enamel coating.

It is up to the industry to arouse the public to the value of foundry products in modern living standards so that our youth will become cognizant of the industry which provides the multitude of everyday conveniences. Once the foundry is generally recognized as an essential industry, in peace time as well as in war time, foundry work will gain wide acceptance as a livelihood that provides excellent opportunities for interesting and successful careers.

Need for Local Support

Education of the layman to the benefits of the foundry should be a feature of the public relations programs of all foundries. In keeping with this crusade, the Hamilton Foundry and Machine Co., Hamilton, Ohio, is doing outstanding work in making the citizens in the Hamilton area aware of the foundry field.

One phase of the Hamilton Foundry and Machine Co. public relations program is "education" of the local teachers, so that their appreciation of foundry products and foundry work can be reflected indirectly in their teaching of grade and high school students.

A recent plant tour conducted for the benefit of the teachers in the Hamilton Public School District did much to convince local educational advisors that a modern foundry is an interesting place of employment. The tour brought the teachers into actual contact with Hamilton employees, and enabled them to observe the various operations involved in the production of castings. In inspecting the plant, they gained a new knowledge of the fundamental value of a foundry career.

A letter of appreciation to Peter E. Rentschler, President of the company, from the Secretary of the Club of Woman Teachers, reads: "In behalf of the club I wish to thank you for your most generous hospitality which provided the opportunity for an educational as well as an enjoyable trip through your foundry. I assure you that this occasion will long be remembered by each of us."

This visit to the Hamilton Foundry and Machine Co. was the first plant visitation made by the club, which was founded in 1898, and the newly acquired conception of foundry work which the tour provided is bound to have beneficial results both for the Hamilton foundry and the industry generally.

Another letter from the Program Chairman of the Hamilton City School District reads: "On behalf of my committee I wish to express our sincere appreciation to you and all the others who helped to make the visit a success. All week from those who were able to be your guests have come expressions and comments of the value of such a trip. As a result, I am sure that we can talk more intelligently on gray iron castings."

The value of this type of educational work cannot be overestimated. It is the kind of support that the industry must have if it is to continue to advance in the post-war world of competition to a rightful place in the Sun!

Foundry Practice Course In Training Program

THE University of California War Training Program is offering a course in "Fundamentals of Foundry Practice and Operations." This course will cover the basic theory of foundry technique, with special emphasis on linking theory to practice.

It will cover all phases of foundry practice from melting, molding, cores, patterns, etc., to heat treating and inspection. Discussion of practical problems will be conducted at the end of each lecture.

J. A. Burgard, Columbia Steel Co., will serve as instructor for the course, which will be conducted at the Huntington Park High School.

The Southern California Chapter is urging attendance by its members and offering the fullest measure of cooperation, in an effort to make the undertaking a complete success.

IMPROVEMENTS

In Pressure Ferrous Castings

INFLUENCING THEIR FUTURE USE

• *This paper, dealing with the highlights of the development and improvements in the centrifugal casting field, was presented at the National War Material Meeting of the Society of Automotive Engineers, Book-Cadillac Hotel, Detroit, June 5-7, 1944. It reviews the history of the process and discusses current applications to offer clues to the future trend of centrifugally cast parts.*

By
E. C. Jeter
Ford Motor Company
Dearborn, Mich.

BY PRESSURE casting we mean any casting whose mold cavity is filled by pouring metal in under pressure from sources other than gravity. This pressure may be exerted by means of centrifugal force, obtained by rotating the mold at suitable revolutions per minute, or this pressure may be obtained by exerting air pressure on molten bath from which the mold cavity is being filled. The former is by far the most widely used method at present, but there are interesting applications of the latter, and the future for this appears bright indeed.

Early Processes

Although centrifugal casting of steel, on any large commercial scale, has been done only in the past two decades and the production of cast iron only slightly longer, centrifugal casting is not new. The first mention on record was in 1809, and was a reference to a patented invention for making castings of high density in a revolving mold.

The first patents issued in the United States were in 1848 and described an apparatus for making centrifugal pipe. There was not much done on centrifugal pipe or any other castings commercially, however, until after World War I.

There followed the deLavaud permanent mold process for pipe which, in turn, was followed by the W. D. Moore sand mold process.

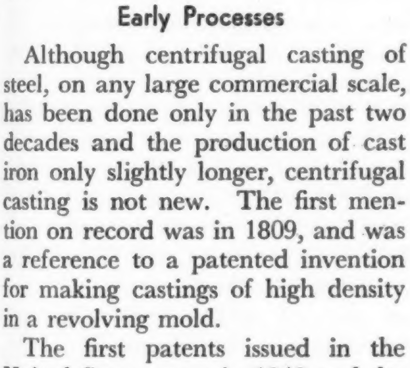

Fig. 1—Cylinder barrels for 2,000 h.p. air cooled aircraft motor.

Both of these methods were, and are, still highly successful means of making cast iron pipe. Watertown Arsenal developed a process for making gun barrels by pouring steel in a spinning metal mold. National Malleable and Steel Casting Company developed a steel car wheel spinning process.

Pre-War Developments

These were the first really major foundry commercial accomplishments, on a large scale, of the centrifugal process. Even these accomplishments were in fields of endeavor where heavy castings were the rule. It wasn't until the early thirties that foundries began to turn their attention to the use of centrifugal force in the manufacture of light weight, high quality castings for internal combustion engines and automotive and truck chassis parts. The first examples were cast iron cylinder sleeves and brake drums.

The centrifugal castings field had been slow in developing for any large scale commercial use. This can be attributed to the fact that certain paralleled industries had to progress to a certain stage before centrifugal castings could make any great strides. Melting equipment had to be suitable. The knowledge of building suitable machines and molds had to be developed. Practical molten metal handling had to be developed to a fine point.

The important point is, however, that once these centrifugal processes were developed they were here to stay. No one can criticize the centrifugal pipe industry as to quality or to economy of manufacture. No one can criticize the economy or quality of the centrifugal cast iron cylinder sleeve.

The knowledge of centrifugal casting had been first gained in gray iron and heavy steel castings. This knowledge was now to be expanded into light, high quality steel castings.

In 1936 the Ford Motor began making, on a commercial basis, transmission and differential gears for trucks and passenger cars. The experience with gears led to the knowledge that centrifugal castings could be economically produced of uniformly high quality as to soundness, and of uniformly high quality as to physical properties.

This can be accomplished without resorting to special analysis or heat treatment. The same analysis that is used for forgings can be used for centrifugal castings. Carburizing as well as oil and water hardening steels have been successfully made. The same procedure, and thus the same equipment, can be used for heat treatment.

Developments Since the War

On the eve of this nation's great struggle to build the tools of war on a scale never before attempted, the field of centrifugal castings had its opportunity to come into its own. There was a demand by Air Force Materiel Command and Ordnance for means of manufacturing vital aircraft and vehicle parts to relieve overtaxed forging capacities.

The Ford Motor Company, which pioneered the field of making small

centrifugal steel castings on a production basis, answered by developing and getting on production in record time a centrifugal casting for air cooled cylinder barrels.

Other foundries began equipping with spinning heads or adding to the heads already in use. Since the beginning of the war the number of foundries engaged in making centrifugal steel castings has more than doubled. The foundries that had been making such castings have more than tripled their facilities.

There have been meetings of committees composed of members from the different foundries engaged in centrifugal casting. These meetings have brought about close contact between these foundrymen.

As a result, there developed a closeness between these foundries that resulted in a partial natural standardization of equipment and means of melting and pouring correctly made steel into revolving molds. The knowledge of this casting field has been pooled to insure an engineer of obtaining castings that can be depended upon for soundness and material quality.

Classification of Castings

Castings made by pressure from centrifugal force must, for clarity, as to quality of product and application, be divided into three classes:

True Centrifugal

Number one is the true centrifugal casting. This is spun in a metal or refractory sand mold about its own axis with the centrifugal force forming all, or most, of the inside contour. The type castings made in this manner are limited to design.

The inside form of the final part cannot be irregular to any large degree. The outside form must be symmetrical, at least to the extent that it can be balanced during spinning. True centrifugal metal mold castings are of the highest quality, and are the ones that may compete with high strength wrought parts.

Examples are: Cylinder barrels or sleeves for aircraft motors or other internal combustion engines, landing gear parts, tubular sections, etc.

Semi-Centrifugal

Number two is the semi-centrifugal casting. This is also spun around its own axis, but employs a core of some nature to form its inside contours. More latitude of design may be had with this type casting than with the true centrifugal. Parts not entirely symmetrical and having an irregular shaped inside form fit into this class. High quality castings are made in this manner and there is a great saving in gates and risers that would be necessary if the same parts were cast statically.

Centrifuge

The third type of centrifugal casting is generally referred to as centrifuging. These type castings are grouped around an independent central axis and there may be many castings around this axis. Layers of castings also may be stacked one on top of another. Castings of a wide variety of shapes may be made in this manner. There is not, however, the guarantee of soundness or high physical properties as in true and semi-centrifugal castings.

Fig. 3—Landing gear hinge pivots.

Some examples of typical castings and physical properties are shown in the illustrations accompanying this paper.

Figure 1 shows a centrifugal cast and a forged cylinder barrel for an air cooled aircraft motor of 2,000 h.p. The forged barrel weighs 47 lb., the cast barrel weighs 40 lb. The pouring weight of the cast barrel is only 40 lb., while the pouring weight of the forged barrel is at least 25 per cent above the 47 lb. Both are made of S.A.E. 4140 material and heat treated in the same manner to a Brinell hardness of 286-321. The centrifugal casting is more economical and the performance is just as satisfactory as the forging.

Table 1 shows physical properties regularly obtained from bars cut from wall of casting.

Figure 2 is a demonstration of results obtained after a hydraulic expansion test. The barrel at right is forged of S.A.E. 4140 steel, and failed at 8700 lb. psi. Note that the barrel split in almost a straight line in a longitudinal direction. The barrel at the left is a cast one. Failure occurred at 9200 lb. psi. There was no particular direction to line of failure, part of the rupture is transverse, the other is longitudinal. The barrel in the middle is another cast specimen that did not fail after application of 10,000 lb. psi. This is the result of improvements in technique and represents present practice.

As additional proof of the quality of this centrifugal cylinder barrel casting, the service record may be cited. There have been more than 900,000 of these finished, and a large

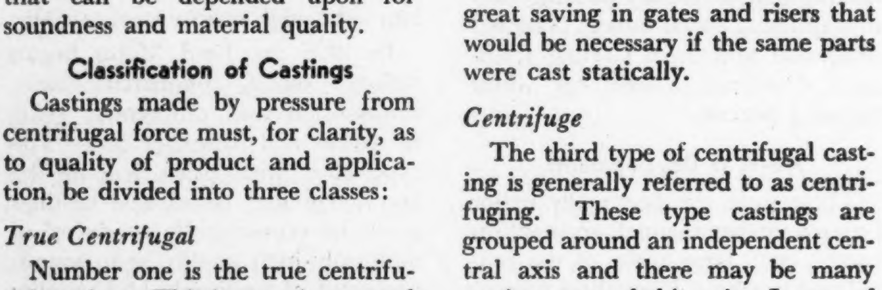

Fig. 2—Results of hydrostatic test.

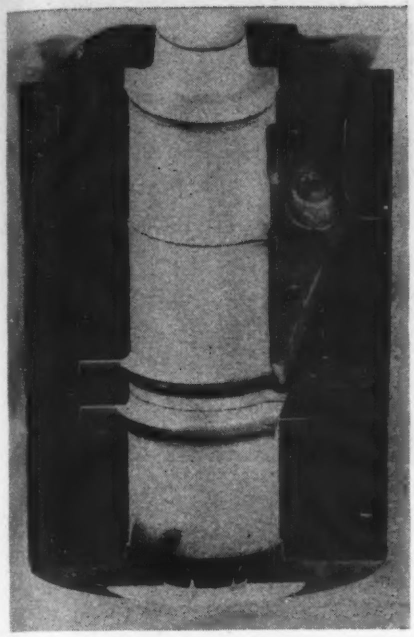

Fig. 4—Cross-section of dry sand mold for hinge pivot.

percentage of them have been put into flying service throughout the world. Failures have been negligible, certainly no more than would be with the same number of forgings.

Loose studs have been found to cause most of the few failures that did occur. Another point to be brought out regarding these centrifugal castings is that there is no more inspection necessary than for forgings. Magnetic inspection is used in semi-finished and again in finished condition. No X-raying or special means of inspection is necessary.

Figure 3 is an illustration of aircraft landing gear hinge pivots. This fabricated structure required 168 inches of arc weld and 9 separate pieces for its construction. The ultimate design load of this part is 209,000 lb. The centrifugal castings stand between 420,000 lb. and 475,000 lb., many of them without failure at the higher figure. This casting is an excellent example of an unsymmetrical part being made as a true centrifugal casting. Material in the pivot is S.A.E. 4140 steel, heat treated to 150,000 psi.

Figure 4 shows a cross-section of an oil sand mold for casting hinge pivot. These core sections are wedged in a tapered steel shell during casting operation. Locater of cores acts as a counter balance for the projection on opposite side.

Figure 5 is an illustration of axles for nose and main landing gears of the B-24 bomber. These are permanent mold, true centrifugal castings, heat treated to a tensile strength of 170,000-190,000 lb. psi. To consistently reach the elongation required with this high tensile, no aluminum is used to deoxidize metal before pouring.

Table 2 indicates the physical properties of bars cut from wall of axles.

Figure 6 shows transmission and differential ring gears cast centrifugally. The ring gear is of a carburizing analysis, S.A.E. 4120.

Figure 7 is a good example of semi-centrifugal castings. These particular castings are armored vehicle four-wheel drive front wheel spindle and ball socket castings. These were made in an oil sand mold of an analysis similar to S.A.E. 1040 steel, and were normalized and heat treated to tensile strength of 140,000 to 150,000 lb. psi. They are good examples of castings spun on own axis with very irregular inside contours. These particular parts would be difficult to forge, and to make them as static castings would require a large waste in material for gates and risers.

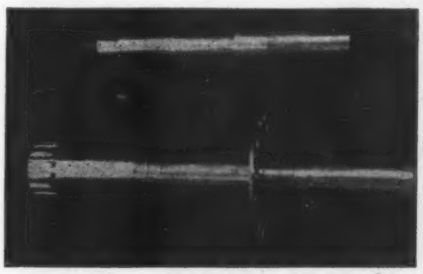

Fig. 5—Landing gear axles centrifugally cast.

Figure 8 is another illustration of a semi-centrifugal casting. This is an idler hub for an armored vehicle. Note the irregular inside contour.

Figure 9 is an illustration of a semi-centrifugal casting of drive sprockets for light armored units. These are all made in oil sand molds and require no machining except for inside diameter and drilling of holes. This is a good example of "mold stacking" to get more than one layer of castings.

Figure 10 is an example of multiple centrifuge casting. These are grouped around a central sprue which is the axis of spin.

Figure 11 shows deflection test of centrifugally cast permanent mold tube—S.A.E. 4140 material, heat treated to 157,000 psi.

Figure 12 is deflection curve of a centrifugally cast permanent mold tube. This work was done to find out if the same higher modulus of rupture for tubular sections held true in cast tubing as it did in wrought tubing. On permanent mold tubes the results compared favorably with that of wrought tubes in this respect.

Dependability

The typical centrifugal castings shown in the illustrations are dependable. All of them either have been, or still are being made as successful production jobs. The very principle of centrifugal casting goes

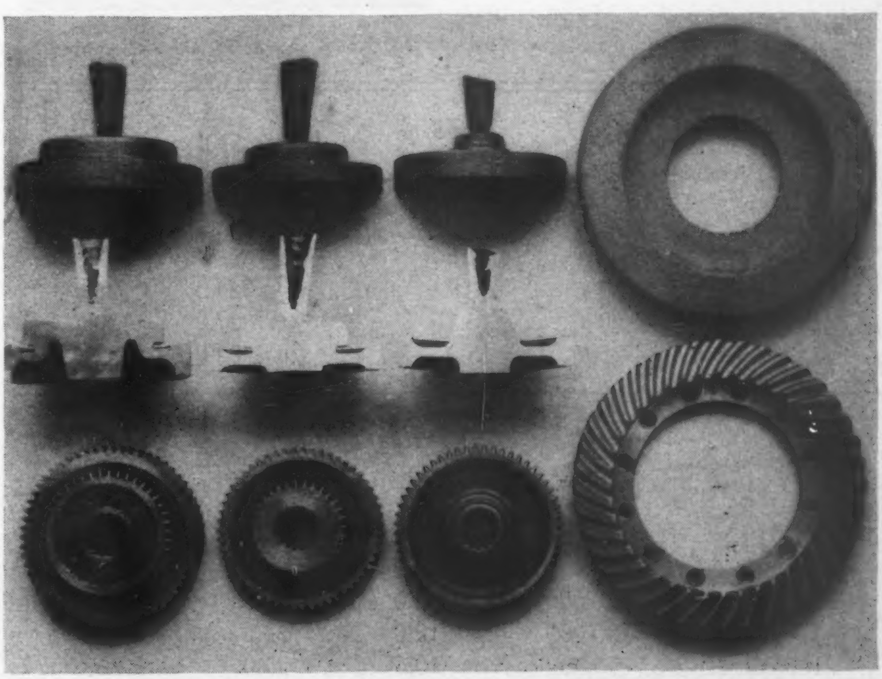

Fig. 6—Centrifugally cast transmission and differential ring gears.

Fig. 7—Spindle and ball socket castings—four-wheel drive armored vehicle.

a long way in eliminating the common foundry defects of hidden blowholes and shrink cavities. In fact, these defects are entirely eliminated in properly controlled, true centrifugal permanent mold casting.

It is the fear of unseen defects that has caused skepticism on the part of engineers when the use of castings for highly stressed parts is mentioned. One well known engineer of Detroit made the statement that if he could be sure of getting a casting free from defects he would be in favor of their wider usage. These castings can be depended upon for uniformity within the casting itself. There are no "inferior" spots adjacent to high quality areas in a true centrifugal permanent mold casting.

Test coupons are taken from wall of casting and thus represent the casting itself as well as the heat of the steel. There is somewhat less surety of this uniformity in many semi and true centrifugal castings made in sand molds. Most centrifuge castings are definitely not as uniform, and although to somewhat less extent, there is the same danger of metal "starved" areas that there is in static castings.

Approximately three years ago the Service Air Forces demanded that centrifugal castings meet 200 per cent of required load on static test similating actual service loading of part. As the Materiel Division of the Army Air Force watched results of the early efforts to substitute centrifugal castings for highly stressed forgings, they lowered this requirement to 125 per cent. This requirement has since been lowered to a mere equal of required load provided adequate physical properties of elongation and tensile strength can be obtained.

Every means of inspection has

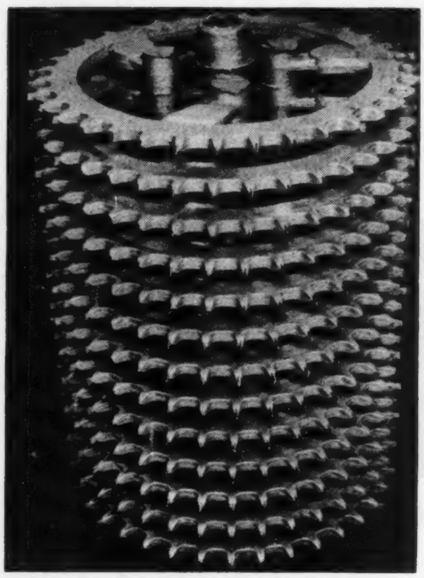

Fig. 9—Drive sprockets universal carrier.

Table 1

PHYSICAL PROPERTIES FROM WALL OF BARREL CASTING

Yield Point, psi.	*Tensile Strength, psi.*	*Elongation per cent in 2 in.*	*Reduction of Area, per cent*	*Izod Impact, ft.-lb.*	*Brinell Hardness*
125,000	141,500	12.0	35.5	37.0	286
126,000	142,000	12.5	39.0	27.0	302
129,500	147,500	15.0	42.2	33.0	321

Table 2

PHYSICAL PROPERTIES FROM WALL OF AXLE CASTING

Yield Point, psi.	*Tensile Strength, psi.*	*Elongation per cent in 2 in.*	*Reduction of Area, per cent*	*Brinell Hardness*
162,500	170,000	14.0	37.0	363
170,000	180,000	12.0	34.5	375
168,000	175,500	10.5	25.0	363
171,500	179,000	9.5	22.0	375

Fig. 8—¾ section idler hub casting.

been used in developing this casting method to its present state of quality: X-rays have been used; magnetic methods of inspection have been used extensively; and exhaustive, destructive physical tests have been used. Although all these tests were used in developing, it is not necessary to resort to X-rays or special inspection methods on the bulk of centrifugal castings after they are on production. Centrifugal castings that are used for highly stressed parts, such as aircraft cylinder barrels, landing gear axles, etc., should naturally be magnetically inspected, just as highly stressed forgings are inspected, but to X-ray also is not necessary or required.

With all the improvements and development to an economical and quality basis, one cannot but feel that more and more use will be made of centrifugal castings.

Although the outstanding improvements, in the past several years, of centrifugal castings has been made with steel, gray iron centrifugal casting made tremendous strides in the period before the war. Engine cylinder sleeves and brake drums were made in large numbers by this method.

The centrifugal casting of gray iron pipe, motor cylinder sleeves and brake drums as a means of production had been successful long before the present war. With the probable wider use of cylinder sleeves and such brake drums, the expansion of this field of casting is assured for the future.

Air Pressure Castings

The use of this method as a large scale commercial producer of specialty castings has been rapid in the

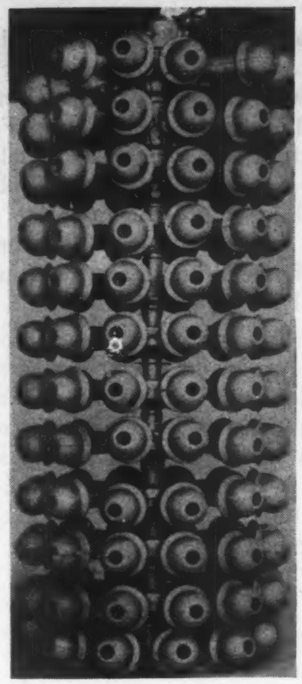

Fig. 10—Centrifuged castings—spring bearing for universal carrier.

past several years. This has been successfully used for castings where machinability is difficult either due to nature of alloy or to design.

Accuracy and Quality

In connection with this, investment molding has been very successfully used. Castings of extreme accuracy and freedom from defects are made by this method. Certain castings of approximately 2-in. length are made within .002 of an inch. These require no machining. The molds are made of a refractory material that can be controlled accurately. Solidification takes place rapidly and under air pressure exerted on top of riser or gate. This solidification under pressure assures soundness.

Here is a method of casting, while expensive within itself, that offers the means of making parts so close in tolerances that they require little, or no machining. Alloys of such nature as to be unmachinable may be cast to finish size. Small parts of such design as to be difficult and expensive to machine may also be cast to size.

Applications

Particular applications at present are supercharger buckets (Fig. 13). Much work is also being done on tools such as cutters, reamers, etc.

Future

Certainly with the improvements already made, designers are going to take advantage of a casting method whereby unmachinable alloys can be made into working parts directly from casting molds. Designers also are going to make use of any method that offers them an opportunity to design parts with disregard for machining difficulties due to design. No already cheaply made part will be added to this pressure casting field. This field has its opportunity among the difficult to manufacture, and thus expensive, parts. It is a specialty and offers vast possibilities for engineers in an unexplored field.

Conclusion

The writer has attempted to describe the highlights of the development and improvements of the centrifugal casting field, and particularly the improvements in steel centrifugal castings in the past several years. The air pressure casting has been described briefly.

The centrifugal casting field progressed through heavy gray iron and steel into light gray iron and then into light steel castings. The history of the development of this field indicates that it will continue to improve and develop into a much larger source of parts. Here is a method of casting that is economical for many parts. It is of such soundness and material quality that it can be used for many highly stressed parts. The method is dependable to the extent that rarely are special means of inspection necessary for production castings.

Within the limits of certain designs this field of casting should, in the future, take its place with the other leading manufacturing methods. The engineer has to weigh all the evidence and decide if he can be served by centrifugally casting certain parts. The two important points to consider: Is it economical and is it of high enough quality? For many parts it is both economical and of extremely high quality.

Fig. 11—Centrifugally cast permanent mold tube after deflection test.

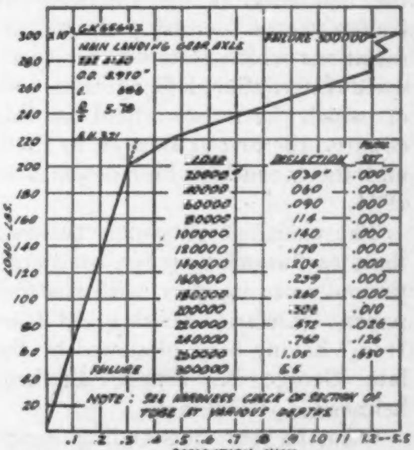

Fig. 12—Deflection curve on cast tube.

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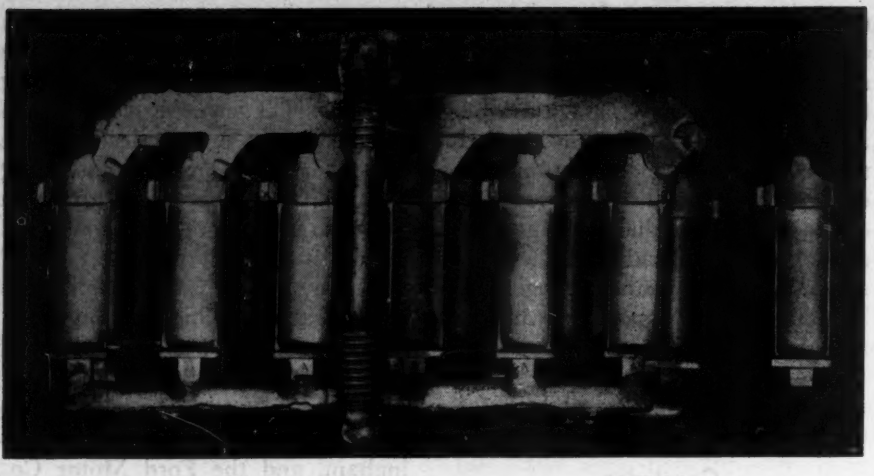


Fig. 13—Investment molded and pressure cast supercharger buckets.

Engineers, April, 1944, meeting at Birmingham.

"Centrifugal Castings," Peter Blackwood and John Perkins, Windsor, Canada. Paper given before American Foundrymen's Association at 1944 Convention, Buffalo, N. Y.

"Centrifugal Casting of Steel," C. K. Donoho, Birmingham, Ala. Paper given before American Foundrymen's Association at 1944 Convention, Buffalo, N. Y.

"Aircraft Requirements of Steel Castings," V. N. Krivobok, METAL PROGRESS, May, 1944.

"Precision Castings of Turbosupercharger Buckets," Albert W. Merrick, IRON AGE, February 10, 1944.

"Process Control Procedure of Steel Castings," S.A.E. War Engineering Board Progress Report No. 1.

1945 EXCHANGE PAPER

To Be Prepared by Frederick G. Sefing

FREDERICK G. SEFING, Research Metallurgist, International Nickel Co., New York, has accepted an invitation to present the official A.F.A. annual exchange paper to the 1945 meeting of the Institute of British Foundrymen.

This exchange of papers between A.F.A. and I.B.F. was started in 1921, shortly after World War I, in an attempt to promote cordial international relations between the foundry technical associations of the world. This movement later led to the formation of an International Committee of foundry technical associations which fostered and sponsored International Congresses, two of which have been held in this country, the first at Detroit, in 1926, and the second at Philadelphia, in 1934.

The exchange of papers between these two associations has been continuous since its start, with the first paper, "Electric Melting of Cast Iron," having been presented by the late George K. Elliott, Lunkenheimer Co., Cincinnati.

Over the years outstanding foundrymen of the two countries have continued this series, and Mr. Sefing's contribution, "Studies of Molding Methods for Production of Sound Castings," no doubt, will be worthy of inclusion as representative of the best work of the American Foundrymen's Association.

Frederick G. Sefing

Mr. Sefing completed a course in metallurgical engineering at Lehigh University in 1919, and in 1924 he received his M.S. degree from the Pennsylvania State College. He has had a varied career: Successively, he was assistant metallurgist for the Hudson Motor Car Co., Detroit; metallurgist, Rockford Drop Forge, Rockford, Ill.; chemical metallurgist, Pennsylvania State College; metallurgist, Michigan State College; and in 1937 he became research metallurgist for the International Nickel Co.

He has written extensively for the trade press and has presented many articles before technical society meetings, on subjects of core strengths, grain size in medium carbon steels, data for determining oil combustion, structure of alloy cast iron, superhardening steels, superheating cast iron, melting characteristics of brass and bronze, normal and abnormal steels, and related subject matter.

Mr. Sefing is especially well known to the foundry industry in the United States and Canada through his work in the A.F.A. For years he has been Chairman of the Committee on Cooperation with Engineering Schools, and he has given numerous talks before chapter meetings. He also served as President of the Metropolitan Chapter.

In his earlier work at Michigan State College he was instrumental in the development of regional gatherings of the Detroit Chapter, which were annual meetings held at Michigan State College. In addition, he has to his credit a large number of research and technical workers who entered the foundry field through his influence as instructor at the Michigan State College.

Bowling Builds Membership For Southern California

By Robt. R. Haley

KEEN competition mixed with good fellowship has made the Southern California bowling program a wonderful success. The increase in applications has made it necessary to have bowling matches on two nights a week instead of one, and it is expected that a third league will soon be formed.

This sports activity, augmenting the regular chapter meetings, brings the members into closer, more frequent contact, building new friendships and increasing the chapter membership.

FOUNDATION OF SAND RAMMER

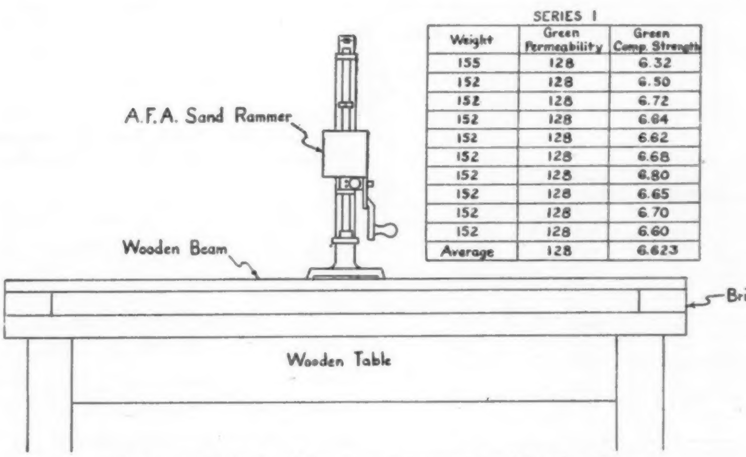
Suspected as Cause of Variations in Test Results

• At a meeting of Subcommittee 6b7 on Physical Properties of Steel Foundry Sands at Elevated Temperatures in Chicago, October 21, 1943, Chairman Finster appointed a sub-committee to "investigate and standardize the method of ramming test specimens and of checking and standardizing tube and stripping post equipment." The sub-subcommittee was composed of H. F. Taylor, Naval Research Laboratory, Washington, D. C., Chairman; H. W. Dietert, Harry W. Dietert Co., Detroit; E. Pragoff, Jr., Hercules Powder Co., Wilmington, Del.; and D. C. Williams, A.F.A. Research Fellow, Cornell University, Ithaca, N. Y. This report summarizes the work done by the sub-subcommittee on rammer supports and was performed at the Naval Research Laboratory under the direction of Mr. Taylor. In this study, various methods of supporting the A.F.A. Standard Sand Rammer were examined to find their effects on sand strength and permeability. It was found that shock absorbing supports were unsatisfactory. Several acceptable methods are described. Mr. Williams is making further studies on the specimen tube which will not be reported herein.

THERE has been considerable discussion regarding the cause of variations in sand test results between various laboratories when an attempt is made to check techniques. One of the conditions suspected of causing variable results is the foundation of the sand rammer. It is agreed generally that it should be as solid as possible, but laboratories differ in their interpretation of the degree of solidity necessary. Interest in standardizing all testing methods is particularly acute at this time because of the recent work of testing sands at elevated temperatures.

Types of Rammer Supports

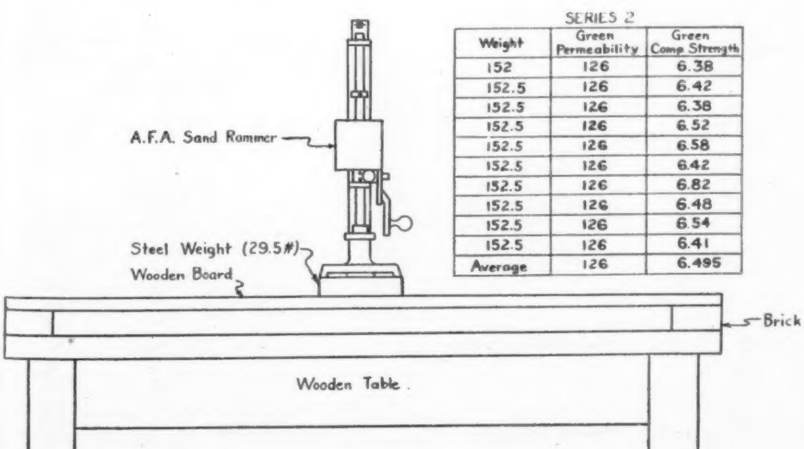
At the Naval Research Laboratory, one rammer is mounted on a cast iron pedestal and the other is mounted on an 8-in. wooden post, both extending down to the concrete floor. Another laboratory uses a 1x18x22-in. steel plate which rests near the center of a large table. Concrete or wooden posts are frequently used for foundations, while some rammers are secured to a table directly over one leg.



SERIES 1

Weight	Green Permeability	Green Comp. Strength
155	128	6.32
152	128	6.50
152	128	6.72
152	128	6.64
152	128	6.62
152	128	6.68
152	128	6.80
152	128	6.65
152	128	6.70
152	128	6.60
Average	128	6.623

Fig. 1—A.F.A. Sand Rammer Mounted on Wooden Beam.



SERIES 2

Weight	Green Permeability	Green Comp. Strength
152	126	6.38
152.5	126	6.42
152.5	126	6.38
152.5	126	6.52
152.5	126	6.58
152.5	126	6.42
152.5	126	6.82
152.5	126	6.48
152.5	126	6.54
152.5	126	6.41
Average	126	6.495

Fig. 2—A.F.A. Sand Rammer Mounted on Wooden Beam with 29.5-Lb. Reaction Block.

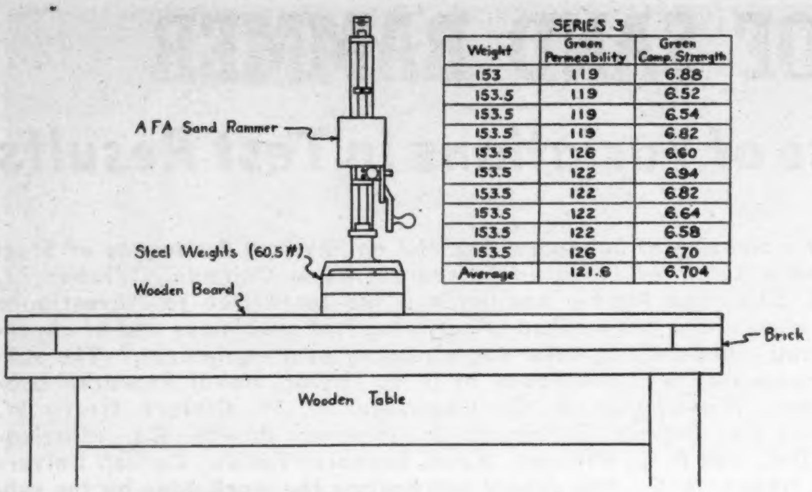
On the underside of the rammer base is a boss which is designed to make good contact with the supporting foundation. It has been noted, however, that in some cases, the boss is not in a plane with the feet at the corners of the rammer. Consequently, if the rammer is placed upon a flat surface, it will be supported only at the corners and will give a springy reaction.

Variations in Technique

Variations also are possible in the method by which the weight is raised and dropped. On rammers equipped with cams and cranks, the speed at which the crank is turned and the way it is manipulated seem to affect the results. On rammers without cranks, variations result from the manner in which the operator holds and releases the weight. Unless the hands are removed quickly, they will absorb some of the energy of the drop. These, however, are variables which can be standardized readily for any given laboratory.

Experimental Procedure

To determine the importance of securely mounting the rammer, a series of tests was made. As a pre-



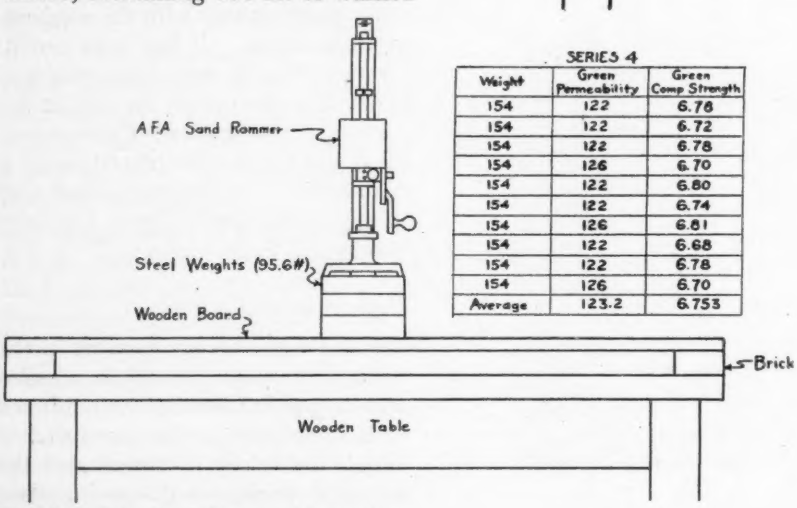
SERIES 3

Weight	Green Permeability	Green Comp. Strength
153	119	6.88
153.5	119	6.52
153.5	119	6.54
153.5	119	6.82
153.5	126	6.60
153.5	122	6.94
153.5	122	6.82
153.5	122	6.64
153.5	122	6.58
153.5	126	6.70
Average	121.6	6.704

Fig. 3—A.F.A. Sand Rammer Mounted on Wooden Beam with 60.5-Lb. Reaction Block.

liminary step, the bottom on the rammer was machined flat and scraped to match a surface plate. It was decided to mount the rammer on several types of foundations, including one with shock absorbers, and to place steel blocks of various weights between the rammer and the shock absorbers to see if it is possible to have a large enough reaction block to deliver all of the ramming energy to the specimen, regardless of the springiness of the foundation.

A 200-lb. batch of sand was mixed, containing 188 lb. of washed



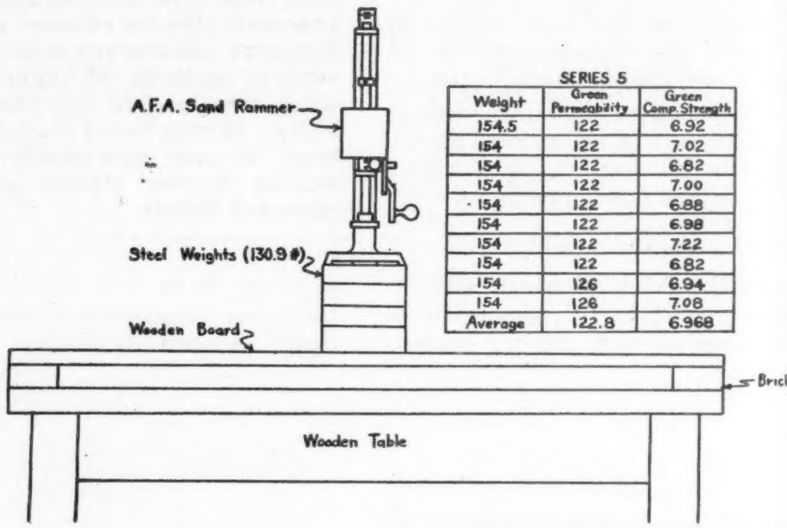
SERIES 4

Weight	Green Permeability	Green Comp Strength
154	122	6.78
154	122	6.72
154	122	6.78
154	126	6.70
154	122	6.80
154	122	6.74
154	126	6.81
154	122	6.68
154	122	6.78
154	126	6.70
Average	123.2	6.753

Fig. 4—A.F.A. Sand Rammer Mounted on Wooden Beam with 95.6-Lb. Reaction Block.

silica sand, 10 lb. of western bentonite, 2 lb. of corn flour binder and approximately 4 per cent water. This was mixed for one minute dry and mulled for 5 min. wet. It was then screened through a ¼-in. mesh screen, placed in a 10-gal. galvanized can with a tight fitting cover, and left to temper overnight.

Before starting tests the next morning, the sand was stirred in the can and a small amount removed and screened again. This was placed in a gallon jar which was sealed immediately. Each series of tests consisted of ten determinations of green permeability and green compressive strength. The weight of the specimen also was recorded. A slight correction was made when necessary on the weight of the second or third specimen. Figures 1 and 18 show the apparatus used and the green permeability and green compressive strength. In each of



SERIES 5

Weight	Green Permeability	Green Comp. Strength
154.5	122	6.92
154	122	7.02
154	122	6.82
154	122	7.00
154	122	6.88
154	122	6.98
154	122	7.22
154	122	6.82
154	126	6.94
154	126	7.08
Average	122.8	6.968

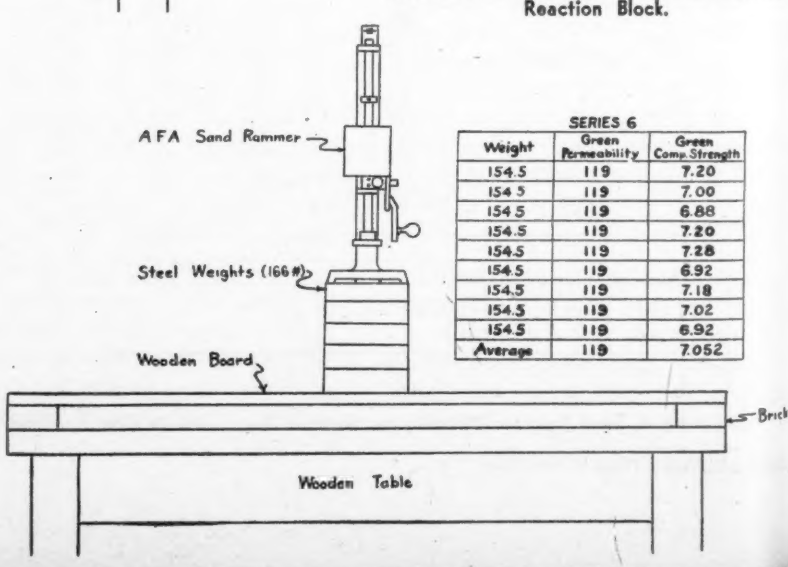
Fig. 5—A.F.A. Sand Rammer Mounted on Wooden Beam with 130.9-Lb. Reaction Block.

the 18 figures, the last line of the data shown is the average of the ten tests.

Discussion of Results

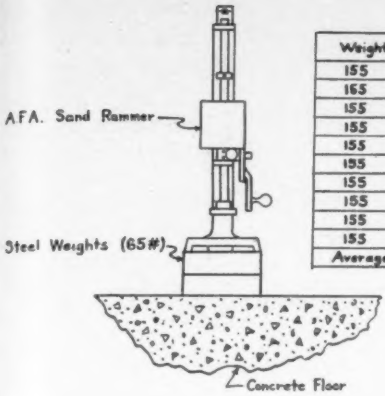
Series 1 to 6 (Figs. 1 to 6, inclusive) were made with the rammer resting on a spruce board 1x12x60 in., which was supported at each end by a brick, so that the unsupported length was 52 in. In Series

Fig. 6 (below)—A.F.A. Sand Rammer Mounted on Wooden Beam with 166.0-Lb. Reaction Block.



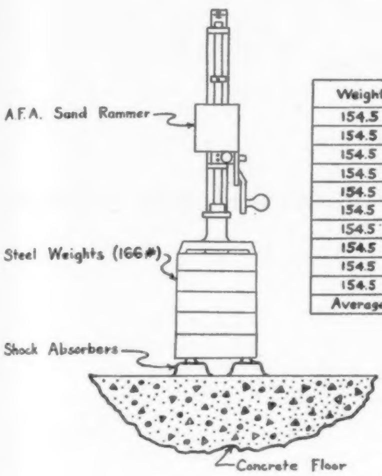
SERIES 6

Weight	Green Permeability	Green Comp. Strength
154.5	119	7.20
154 5	119	7.00
154 5	119	6.88
154.5	119	7.20
154.5	119	7.28
154.5	119	6.92
154.5	119	7.18
154.5	119	7.02
154.5	119	6.92
Average	119	7.052



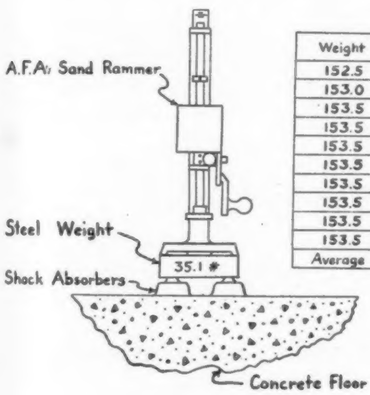
SERIES 7

Weight	Green Permeability	Green Comp. Strength
155	112	7.20
165	112	7.38
155	112	7.24
155	112	7.30
155	115	7.12
155	112	7.22
155	112	7.12
155	112	7.30
155	112	7.28
155	112	7.28
Average	112.3	7.244



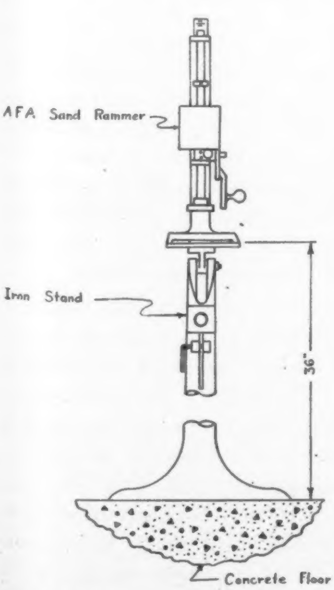
SERIES 8

Weight	Green Permeability	Green Comp. Strength
154.5	119	6.94
154.5	119	6.88
154.5	119	6.78
154.5	119	7.12
154.5	119	6.92
154.5	119	6.84
154.5	119	7.12
154.5	119	7.06
154.5	119	6.94
154.5	119	7.02
Average	119	6.962



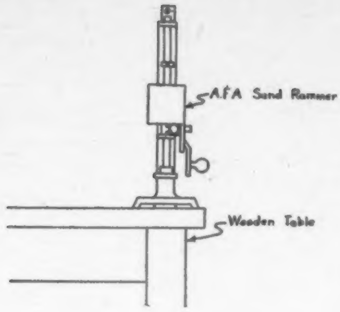
SERIES 9

Weight	Green Permeability	Green Comp. Strength
152.5	128	6.88
153.0	126	7.12
153.5	128	6.52
153.5	128	6.70
153.5	126	7.10
153.5	126	6.88
153.5	126	6.84
153.5	128	7.18
153.5	128	6.80
153.5	128	6.64
Average	127.2	6.866



SERIES 10

Weight	Green Permeability	Green Comp. Strength
155	115	7.18
155.5	112	7.52
155.5	115	7.38
155.5	115	7.18
155.5	115	6.80
155.5	115	7.30
155.5	115	7.20
155.5	115	7.10
155.5	115	7.12
155.5	115	7.58
Average	114.7	7.236

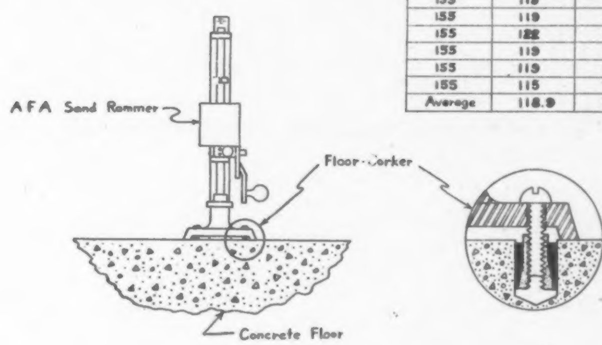


SERIES 11

Weight	Green Permeability	Green Comp. Strength
154.5	115	7.22
155	115	7.42
155	115	7.28
155	115	7.30
155	115	7.25
Average	115	7.294

SERIES 12

Weight	Green Permeability	Green Comp. Strength
155	119	7.38
155	119	7.40
155	119	7.32
155	119	7.40
155	119	7.50
155	119	7.38
155	122	7.20
155	119	7.62
155	119	7.86
155	115	7.66
Average	118.9	7.472



SERIES 13

Weight	Green Permeability	Green Comp. Strength
155	122	6.98
154	122	7.20
154	122	7.40
154	122	7.28
154	126	7.08
154	122	7.10
154	122	7.02
154	122	6.98
154	126	6.92
154	122	7.42
Average	123.2	7.138

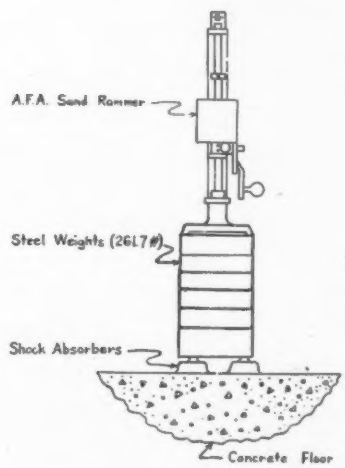


Fig. 7 (Series 7)—A.F.A. Sand Rammer Mounted on Concrete Floor.

Fig. 8 (Series 8)—A.F.A. Sand Rammer Mounted on Shock Absorbers with 166.0-Lb. Reaction Block.

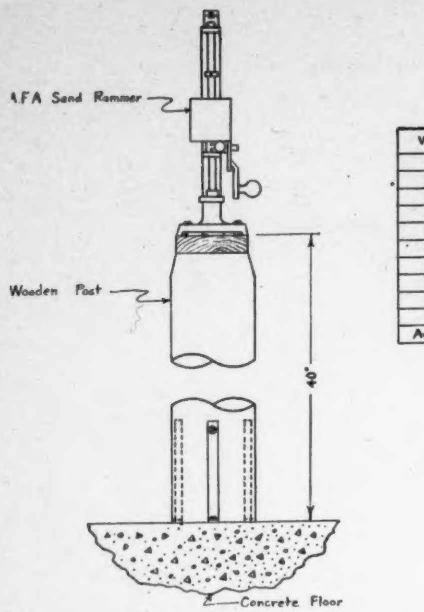
Fig. 9 (Series 9)—A.F.A. Sand Rammer Mounted on Shock Absorbers with 35.1-Lb. Reaction Block.

Fig. 10 (Series 10)—A.F.A. Sand Rammer Mounted on Iron Stand.

Fig. 11 (Series 11)—A.F.A. Sand Rammer Mounted on Corner of Wooden Table, 1st Day.

Fig. 12 (Series 12)—A.F.A. Sand Rammer Mounted on Floor and Secured with Corkers.

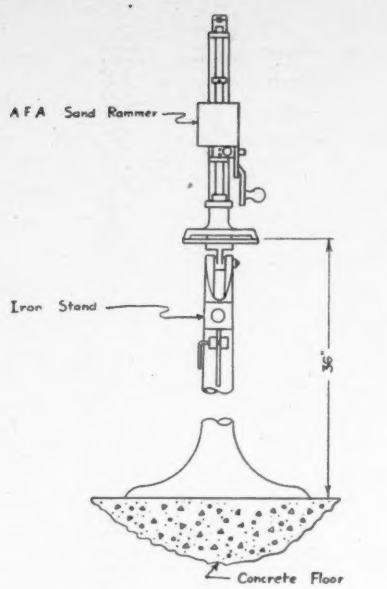
Fig. 13 (Series 13)—A.F.A. Sand Rammer Mounted on Shock Absorbers with 261.7-Lb. Reaction Block.



SERIES 14

Weight	Green Permeability	Green Comp. Strength
155	122	7.28
154.5	122	7.28
154.5	122	7.64
154.5	122	7.46
154.5	122	7.35
154.5	122	7.48
154.5	122	7.50
154.5	122	7.64
154.5	122	7.50
154.5	122	7.48
Average	122	7.471

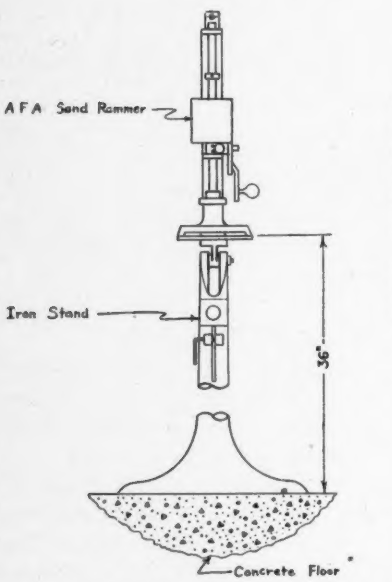
Fig. 14—A.F.A. Sand Rammer Mounted on Wooden Post.



SERIES 15

Weight	Green Permeability	Green Comp Strength
154.5	126	7.22
154	126	7.42
154	122	7.34
154	126	7.46
154	126	7.50
154	126	7.24
154	126	7.36
154	126	7.42
154	126	7.42
Average	125.6	7.368

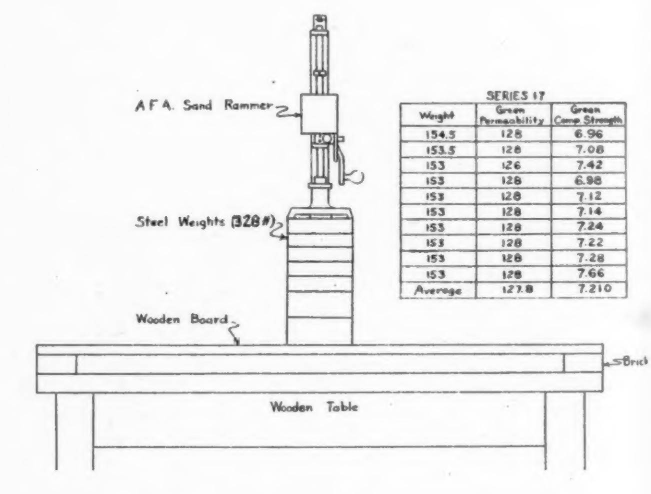
Fig. 15—A.F.A. Sand Rammer Mounted on Iron Stand, 1st Operator.



SERIES 16

Weight	Green Permeability	Green Comp. Strength
154	126	7.48
154	126	7.52
154	128	7.52
154	126	7.43
154	126	7.51
154	126	7.56
154	126	7.52
154	126	7.47
154	126	7.45
154	126	7.43
Average	126.2	7.489

Fig. 16—A.F.A. Sand Rammer Mounted on Iron Stand, 2nd Operator.



SERIES 17

Weight	Green Permeability	Green Comp. Strength
154.5	128	6.96
153.5	128	7.08
153	126	7.42
153	128	6.98
153	128	7.12
153	128	7.14
153	128	7.24
153	128	7.22
153	128	7.28
153	128	7.66
Average	127.8	7.210

Fig. 17—A.F.A. Sand Rammer Mounted on Wooden Beam with 328-Lb. Reaction Block.

1, the rammer base was clamped directly to the board as shown in Fig. 1. In Series 2 to 6, additional weights were added between the base of the rammer and the board, as shown in Figs. 2 to 6, inclusive.

It was thought that it might be possible to add enough mass so that energy from the drop weight would all be transferred to the specimen. The average of these six series of tests show that with 166 lb. underneath the rammer, compressive strength values are still lower than for a solid foundation. Since green compressive strength seems to be the most sensitive test, the results of the test will be discussed instead of density and green permeability. These values also are reported in the tables, for general interest.

First Test Series

Series 7 (Fig. 7) shows the results of placing the rammer on the concrete floor. The weights were placed under the rammer, but at this time no method was available for fastening the assembly to the floor. The average green compressive strength was 7.244 psi. The last figure has little significance and is retained only for computing per cent deviation from the average results. Extrapolating the curve shown in Fig. 19 to intersect the strength value produced by placing the rammer on the concrete floor, indicated the possibility that placing weights totalling 250 lb. under the rammer base might give results equal to those produced when the rammer was placed on the concrete floor. In later tests, this did not prove to be the case.

As an alternative to the board, a group of rubber shock absorbers was placed under a stack of five weights as shown in Fig. 8. The green compressive strength produced in this case was 6.962 psi. A similar arrangement was tried with only one weight between shock absorbers and the base of the rammer. It is shown in Fig. 9. This mounting produced

a green compressive strength of 6.866 psi. Thus, it is seen that even with a weight of 166 lb., maximum compressive strength can not be developed on shock absorbing devices.

Series 10 (Fig. 10) shows the effect of placing the rammer on the iron stand which has been used here for several years. The strength produced was 7.236 psi. This checks very closely with that produced with the rammer on the floor.

Series 11 (Fig. 11) includes only five tests and was made with the rammer fastened to the top of the table over one leg. The table top was a 2-in. plank, and the legs were 4x4-in. square and about 30-in. long. The strength produced was 7.294 psi.

Second Test Series

The tests described above were completed on the same day. Two days later, seven more series of tests were run which were made on the same batch of sand, but the results are not necessarily comparable to those from the tests described above because the sand had two additional days to temper. The first of these tests, Series 12 (Fig. 12), was made with the rammer fastened to the concrete floor by small expansion shields called corkers. Care was taken to select a very flat area on the concrete. The strength produced was 7.472 psi.

Series 13 (Fig. 13) was made with the rammer placed on rubber shock absorbers with weights totalling 261.7 lb. The strength produced was only 7.138 psi., which is well below that produced by a rigid support.

In Series 14 (Fig. 14), the rammer was placed on a wooden foundation consisting of a cylindrical post of 8-in. diameter and 38-in. high, to the top of which was fastened an oak block 2x7x10-in. The post was fastened to the floor and the rammer secured to the top. The strength produced was 7.471 psi., which is almost identical with that produced when the rammer was on the concrete floor.

The tests on the iron stand were made by two different operators and are shown as Series 15 and 16 (Figs. 15 and 16) and in Table 1. The strength of the specimens made by the first operator was 7.368 psi., while that produced by the second was 7.489 psi., a difference of 0.121 psi. The average of these results is 7.428 psi. The deviation from the average is 0.06 psi. and the per cent deviation is 0.8 per cent. This is believed to be satisfactory agreement for tests of this type.

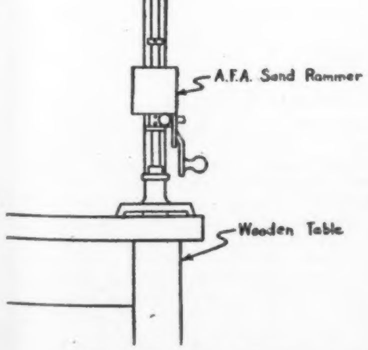
Third Test Series

To give the shock absorbing devices the best possible test, it was decided to run one more series with a heavier weight than had been used previously. The board was used as before and loaded with steel blocks with weights totalling 328 lb. The rammer was clamped on top of these and ten tests were made in which the green compressive strength averaged 7.210 psi., as shown in Series 17

Table 1

Summary of Test Results

Date of Test	*Series No.*	*Specimen Weight, Grams*	*Green Permeability*	*Green Compressive Strength, psi.*	*Description of Foundation*
11/17/43	1	152	128	6.623	Board as described
	2	152.5	126	6.495	Board with 29.5 lb.
	3	153.5	121.6	6.704	60.5 lb.
	4	154	123.2	6.753	95.6 lb.
	5	154	122.8	6.968	130.9 lb.
	6	154.5	119	7.052	166.0 lb.
	7	155	112.3	7.244	Concrete floor plus 65 lb., no corkers
	8	154.5	119	6.962	Shock absorbers plus 166 lb.
	9	153.5	128	6.866	35.1 lb.
	10	155.5	115	7.236	Corner of table
	11	155	115	7.294	Iron stand
11/19/43	12	155	118	7.472	Concrete floor—corkers
	13	154	123.2	7.138	Shock absorbers plus 261.7 lb.
	14	154.5	122	7.471	Wooden post
	15	154	125.6	7.368	Iron stand
	16	154	126.2	7.489	Iron stand
	17	153	128	7.210	Corner of table
	18	154.5	126	7.526	Board with 328 lb.



SERIES 18

Weight	Green Permeability	Green Comp. Strength
154.5	126	7.42
154.5	126	7.52
154.5	126	7.68
154.5	126	7.50
154.5	126	7.52
154.5	126	7.72
154.5	126	7.48
154.5	126	7.40
154.5	126	7.52
154.5	126	7.50
Average	126	7.526

Fig. 18—A.F.A. Sand Rammer Mounted on Corner of Wooden Table, 2nd Day.

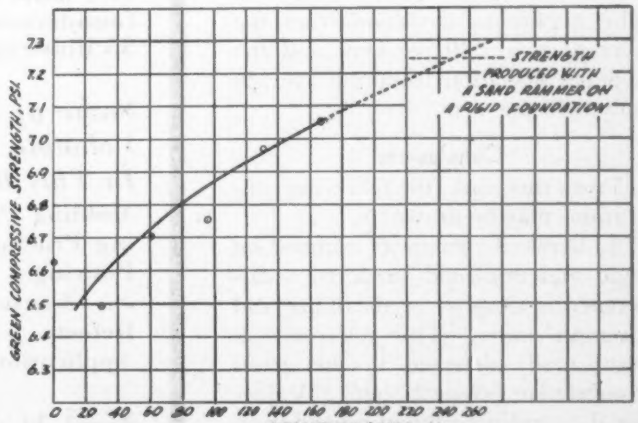


Fig. 19—Strength as a Function of Weight of Reaction Block.

Table 2

Comparison of Results on Different Days Using Rigid Foundations

Date of Test	*Series No.*	*Average of Series, psi.*	*Deviation from the average*	*Per Cent Deviation from the average*
11/17/43	7	7.244	0.014	0.19
	10	7.236	0.022	0.30
	11	7.294	0.036	0.49
		7.258—Average compressive strength on rigid foundations		
11/19/43	12	7.472	0.007	0.09
	14	7.471	0.006	0.08
	15	7.368	0.097	1.30
	16	7.489	0.024	0.32
	18	7.526	0.061	0.82
		7.465—Average compressive strength on rigid foundations		

(Fig. 17). From this it is concluded that it is not practical to use shock absorbing devices or other non-rigid supports.

Fourth Test Series

For the final series of tests, the corner of the table was sanded to a very flat surface and the rammer clamped tightly to it. These tests, Series 18 (Fig. 18), produced a green compressive strength of 7.526 psi. The average results from the 18 series described above are shown on Table 1.

Comparison of Test Results

Since these tests were made on different days, those made the first day are not comparable to those made two days later. To form a basis for comparison, it was decided to average the results of tests made on the rigid supports for each day separately. The individual results for each day then may be discussed as percentage deviations from the average for that day. This information is shown in Table 2. The green compressive strength is 0.207 psi. higher on the second day than on the first. The maximum deviation from the average was 1.30 per cent and the average deviation from the average only 0.45 per cent.

Conclusions

From this work, the following conclusions may be drawn:

1. Between specimens rammed on rigid and non-rigid supports, a difference in density, permeability and strength exists. This difference is most easily detected in the green compressive strength tests. Values for the conditions tested ranged from 6.50 to 7.53 psi.

2. Non-rigid supports should not be used. These include wooden tables, tables on wooden floors, etc. Setting the rammer over the leg of a heavy table seems to be very satisfactory if supported on a concrete floor or foundation.

3. Shock absorbing devices, even with large weights between the rammer and the shock absorbers, do not produce specimens equivalent to those made on rigid supports.

4. Only minor differences were found to exist between the various types of rigid support. Steel, concrete or wooden columns securely anchored, with the rammer fastened tightly to the top, are all satisfactory. They should rest on a substantial floor, preferably of concrete. Mounting the rammer directly over the leg of a heavy table produced good results. In this case, care should be taken to be sure that the fit between the rammer base and the table top is good.

5. All four legs and the boss under the drop weight should bear on the support and the rammer should be securely bolted down.

6. It is desirable to have the bottom side of the rammer base machined flat or at least so that the boss and all the legs are in the same plane. A good fit to any flat surface is then assured.

Acknowledgment

The Sub-Subcommittee owes thanks to R. E. Morey, Naval Research Laboratory, who conducted the tests and prepared the report; also to the Navy Department for sponsoring the work.

STUDY OF MOLDING MATERIAL
Conducted by No. California Chapter

AN EXAMPLE of how an A.F.A. chapter employed its local membership talent for the solution of a local technical problem is shown in a recent report published by the Northern California chapter. The report covers investigations made by a special committee on foundry sands and mold materials in the Pacific Coast area.

The idea for study originated with several foundrymen in the San Francisco region, who felt that some local sands in suitable combinations with other materials might be found which would serve local needs.

Action on the plan began in August, 1943, at which time Harry A. Bossi, H. C. Macaulay Foundry Co., Berkeley, Calif., was the Chapter President. A committee of 32 was appointed, including shop men representing 18 foundries in the district, Stanford University, H. A. Bossi; Ralph C. Noah, San Francisco Iron Foundry, the present President of the chapter; and Chapter Secretary Geo. L. Kennard, Northern California Foundrymen's Institute.

Following the organizational meetings at which H. E. Henderson, H. C. Macaulay Foundry Co., was elected chairman of the committee, a questionnaire was sent to 17 local foundries requesting information on their use of molding materials. The committee further visited 8 separate iron, steel, non-ferrous and malleable foundries for the purpose of studying sands and mold materials under actual operating conditions. The plants visited were as follows:

H. C. Macaulay Foundry Co., Berkeley.

Pacific Brass Foundry of San Francisco, San Francisco.

Vulcan Foundry Co., Oakland.

Pacific Steel Castings Co., Berkeley.

American Manganese Steel Div., American Brake Shoe Co., Oakland.

Kingwell Bros. Ltd., San Francisco.

Enterprise Engine & Foundry Co., San Francisco.

General Metals Corp., Oakland.

As a result of this work the Foundry Sands and Mold Materials Committee has issued Report No. 1, an interesting pamphlet of some 60 pages. It includes studies of facing and mold sand mixtures, backing sands, core and mold washes and core and molding sand practice in gray iron, non-ferrous, steel and magnesium foundries. The completeness of the report should be of interest to many chapters who may be planning similar studies of specifically local problems.

Secretary Kennard now advises that the initial work of the committee has been so well received that it will be continued during the coming year. The committee has been reorganized with a considerably increased membership, representing 23 foundries and 10 service and supply firms. Further investigations will be made through subcommittees on iron, steel, non-ferrous and magnesium practice and service and supplies, with monthly meetings scheduled.

The Northern California's Chapter Foundry Sands and Mold Materials Committee held its November 14 meeting at the Phoenix Iron Works, Oakland, as the guests of S. D. Russell, National A.F.A. Director, and his son, Weldon. The present committee is headed by Wm. W. Clark, Enterprise Engine & Foundry Co., Chairman; Geo. W. Stewart, Pacific Brass Foundry of San Francisco, Vice-Chairman; Donald L. Mason, Stanford University, Technical Advisor; Miss Lesley McDonald, Enterprise Engine & Foundry Co., Reporter; and Geo. L. Kennard, Northern California Foundrymen's Institute, Secretary.

APPRENTICE CONTESTS

To Include Four Competitions in 1945

THE Apprentice Molding and Patternmaking Contests which have been sponsored annually by the A.F.A. Apprentice Training Committee, again will be held in 1945, with the winners of the local competitions submitted for the National Contest at the Foundry Congress to be held in Detroit, April 30-May 4.

Despite the war and the reduced number of apprentices, last year's national contest had 27 entries, representing the following companies:

International Harvester Co., Tractor Works, Chicago.

Caterpillar Tractor Co., Peoria, Ill.

American Manganese Steel Div. American Brake Shoe Co., Chicago Heights, Ill.

Gisholt Machine Co., Madison, Wis.

Ann Arbor Foundry Co., Ann Arbor, Mich.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

Pattern Manufacturers, Associated Industries of Cleveland, Cleveland.

Universal Foundry Co., Oshkosh, Wis.

Allis-Chalmers Mfg. Co., Milwaukee.

Nordberg Mfg. Co., Milwaukee.

Lawran Foundry Co., Milwaukee.

Vilter Mfg. Co., Milwaukee.

Wisconsin Aluminum Foundry Co., Manitowoc, Wis.

Foundry Group, Associated Industries of Cleveland, Cleveland.

Cleveland Trade School, Cleveland.

The Contest Committee has developed contest regulations for both the local or district competitions and the national contest, and supplies patterns for the molding apprentices and blueprints for the pattern apprentices. The local contests may be sponsored by either individual foundries or pattern shops or by groups such as the A.F.A. Chapters.

Four groups of competitions have been approved for 1945: Gray Iron Molding, Steel Molding, Non-Ferrous Molding and Patternmaking.

National Contest prizes for 1st, 2nd and 3rd place in each of the groups will be awarded at Detroit, with the prizes in each competition $30, $20 and $10, respectively. Prize money is supplied by the Board of Awards of the Association.

The Apprentice Contest Committee is composed of the following:

Chairman, C. W. Wade, Caterpillar Tractor Co., Peoria, Ill.

G. A. Zabel, Universal Foundry Co., Oshkosh, Wis.

Jas. G. Goldie, Cleveland Trade School, Cleveland.

Frank C. Cech, Cleveland Trade School, Cleveland.

C. W. Morisette, Milwaukee Vocational School, Milwaukee.

E. P. Meyer, Chain Belt Co., Milwaukee.

L. Larsen, A.F.A., Chicago.

Any foundry or pattern shop manager desiring to enter the apprentice contests may receive copies of the regulations and the blueprints or patterns by writing to the Secretary, Apprentice Contest, American Foundrymen's Association, 222 W. Adams St., Chicago 6, Ill.

Iron Sand Committee To Make Study of Cores

AT a meeting held in the Horace Rackham Memorial, Detroit, on October 30, a subcommittee of the Foundry Sand Research Project Committee on Elevated Temperature Properties of Foundry Sands was formed to study the effect of elevated temperatures on iron molding materials.

Those present were Harry W. Dietert, Harry W. Dietert Co., Detroit, who is chairman of the subcommittee; Leon B. Thomas, Wilson Foundry & Machine Co., Pontiac, Mich.; J. A. Gitzen, Delta Oil Products Co., Milwaukee, Wis.; Robt. Doelman, Harry W. Dietert Co., Detroit; Arnold Satz, National Radiator Co., New Castle, Pa.; Prof. W. A. Spindler, University of

Michigan, Ann Arbor, Mich.; John Grennan, University of Michigan, Ann Arbor, Mich.; E. W. Olsen, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; J. S. Schumacher, Hill and Griffith Co., Cincinnati; and H. G. McMurry, Buick Motor Co., Flint, Mich.

Chairman Dietert opened the meeting with a discussion of how the high temperature properties relating to iron molding sands could be attacked. It was finally decided that the committee would devote its efforts to a study of cores. Methods were set up to determine the penetration of molten iron into a specially designed blind core which would emphasize the penetration effect. In addition, a casting was designed by means of which it will be possible to determine the relative shake-out value of five basic types of core mixtures used in the gray iron and malleable foundry.

Considerable of the work will be done at the University of Michigan, under the direction of Professor Spindler, with members of the committee participating at their respective plants. While it will take some time for the apparatus, patterns, etc., to be used in connection with the investigation to be secured, the committee felt that once the work was begun, progress would be rapid. In addition to the practical tests previously mentioned, the properties of the mixtures used in the investigation will be determined by the various tests, both standard and non-standard at elevated and room temperatures, which are at present applied to iron core mixtures.

Inspection Committee Plans Two Sessions

ALTHOUGH the Inspection of Castings Committee is one of the newest of the A.F.A. committees, plans are already under way for taking over two sessions at the A.F.A. Foundry Congress to be held in Detroit April 30-May 4, 1945. Last spring the committee sponsored one session at the Buffalo convention and the committee felt that the subject is of such vital concern to the foundry industry, and that enough interest has been shown, to warrant two sessions at the Detroit meeting.

Discussion at a recent meeting of the committee indicates that the inspection of castings is of such real value to the modern foundry that more executives should be made acquainted with the best possible procedures and devices for inspecting castings. With this in mind, the committee felt that its membership should be enlarged to include foundry owners and foundry operators as well as those primarily interested in the inspection of castings.

The creation of a broad outline is being considered so that future papers may be presented first in the *Transactions* or AMERICAN FOUNDRYMAN and later be included in an inspector's manual planned as an A.F.A. publication.

Local chapters may wish to create inspection of casting committees so that papers may be presented at chapter meetings. Some chapters have had good turnouts with the entire meeting devoted to inspection methods. The subject is of great concern to the foundry industry because properly inspected castings create a favorable impression upon the buyer of castings.

Safe Handling Practices On the Home-Front

A FEATURE from "Brake Shoe News," house organ of the American Brake Shoe Co., recently carried a feature, "Wheel Rolling Is an Art." Part of the story included points of interest on safe handling practices that will be of interest to readers of the AMERICAN FOUNDRYMAN.

The illustrations on this page show two men in the Hays Plant at Pittsburgh demonstrating the correct way to lift a 750-lb. wheel with a safety stick. After the stick is inserted in the hub, the men begin to raise the wheel slowly, using the proper leverage.

Steady pressure is exerted on the stick by one man, while the other takes his position at the wheel for control before giving it a final pull into a firm upright position.

Safe handling practices do much to reduce on-the-job accidents, too often resulting from careless working methods.

NEW ASSOCIATION MEMBERS

(October 16 to November 15, 1944)

• Three more chapters actively participated in the regular A.F.A. New Members Drive during the monthly period just past, and the arrow indicating the Association's growth continues to point upward. Twenty-seven out of 28 groups rang up a total of 243 New Members, with the Chicago group taking first honors with a total of 30 names added to its roster!

BIRMINGHAM CHAPTER

Donald C. Abbott, Sales, Hill & Griffith Co., Birmingham.
W. J. Belmont, Metallurgist, Stockham Pipe Fittings Co., Birmingham.
Frank H. Coupland, Jr., Asst. Supt. Fdries., American Cast Iron Pipe Co., Birmingham.
Lester A. Hogan, Foreman Static Steel Fdry., American Cast Iron Pipe Co., Birmingham.
L. G. Payne, Supt. of Foundries, Le Tourneau Co. of Georgia, Toccoa, Ga.
John C. Wallace, Jr. Met., Stockham Pipe Fittings Co., Birmingham.

CANTON DISTRICT CHAPTER

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Russell Greenawalt, Asst. Foreman (Foundry), The Deming Co., Salem, Ohio.
Howard Holloway, Foreman, Core Room, The Deming Co., Salem, Ohio.
Earl J. Housekeeper, Asst. Mgr., The Wooster Brass Co., Wooster, Ohio.
Dallas E. Martin, Fdry. Foreman, Wooster Brass Co., Wooster, Ohio.
***Ohio Ferro Alloys Corp., Canton, Ohio (G. W. Starr, Vice Pres., Sales).**
Charles A. Stroup, Chief Chemist, American Steel Foundries, Alliance, Ohio.
Floyd Stroup, Metallurgist, Ohio Ferro Alloys Corp., Canton, Ohio.
C. J. Trump, Machine Steel Castings Co., Alliance, Ohio.

CENTRAL INDIANA CHAPTER

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Harold R. Linville, Foundry, Time Study, International Harvester Co., Indianapolis, Ind.
A. Timmerman, Core Room Foreman, International Harvester Co., Indianapolis.
W. B. Willetts, General Foreman, International Harvester Co., Indianapolis.

CENTRAL NEW YORK CHAPTER

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***S. Cheney & Son, Manlius, N. Y. (S. C. Cheney, Pres.).**
M. B. Dewey, Prod. Mgr., Syracuse Foundry, Inc., Syracuse, N. Y.
George R. Pickston, Fdry. Supt., S. Cheney & Son, Manlius, N. Y.

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Francis W. Boulger, Asst. Supv., Battelle Memorial Institute, Columbus.
E. M. Breithaupt, Plant Engr., Commercial Steel Castings Co., Marion, Ohio.
Arthur R. Elsea, Research Engr., Battelle Memorial Institute, Columbus, Ohio.
Ulf Kjerrman, Research Associate, Battelle Memorial Institute, Columbus, Ohio.
John G. Kura, Research Engr., Battelle Memorial Institute, Columbus, Ohio.
Dalton Miller, Foundry Foreman, The Newark Stove Co., Newark, Ohio.
***Newark Stove Co., Newark, Ohio (A. C. Cleaver, Gen'l. Foundry Supervisor).**
Glen Penry, Quality Supv., Commercial Steel Casting Co., Marion, Ohio.
George Porter, Core Foreman, Commercial Steel Casting Co., Marion, Ohio.
Harold Tobin, Molding Foreman, Commercial Steel Casting Co., Marion, Ohio.
Murray C. Udy, Research Met., Battelle Memorial Institute, Columbus, Ohio.
Robert A. Willey, Met., Commercial Steel Casting Co., Marion, Ohio.
Russell J. Wilson, Cleaning & Grinding Foreman, Newark Stove Co., Newark, Ohio.
Paul K. Wince, Met., The Newark Stove Co., Newark, Ohio.

CHESAPEAKE CHAPTER

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L. C. Robinson, Sales Engr., Chicago Pneumatic Tool Co., Philadelphia, Pa.
Jack H. Schaum, Met., Naval Research Laboratory, Washington, D. C.
George E. Schmidt, Jr., Sand Tech., Naval Research Laboratory, Washington, D. C.
Lt. (jg) Robert C. Wayne, U.S.N.R., Met., Naval Research Laboratory, Washington, D. C.
Chester G. White, Service Engr., Gibson & Kirk Co., Baltimore, Md.

* Company Member

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John Bartus, Foreman, Pettibone Mulliken Corp., Chicago.
Glenn E. Cramer, Supt. of Alloy Fdry., American Manganese Steel Co., Chicago Heights, Ill.
John William Crapple, Plant Engineer, Universal Castings Corp., Chicago.
H. J. Elgin, Mgr., Nickel Alloy Sales Dept., Steel Sales Corp., Chicago.
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J. Horsfield, Gen. Fore., Dodge Chicago Plant, Div. Chrysler Corp., Chicago.
B. Joslin, Charge of Finishing & Heat Treat., Dodge Chicago Plant, Div. Chrysler Corp., Chicago.
Serge Kamarovsky, Met., International Harvester Co., Chicago.
Charles B. Lamoine, Casting Engr., Chicago Hardware Foundry Co., No. Chicago.
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L. S. Murphy, Sales, Liquid Carbonic Corp., Chicago.
Paul Olson, Apprentice, Washburne Trade School, Chicago.
Raymond C. Ortgies, Whiting Corp., Harvey, Ill.
Sam Palumbo, Insp., Foreman, Dodge Chicago Plant Div., Chrysler Corp., Chicago.
Raymond G. Pence, Hydro-Blast Corp., Chicago.
Richard Petersen, Apprentice, Washburne Trade School, Chicago.
Harold A. Prest, Owner, Prest Pattern Works, Chicago.
Robert V. Rose, Sales Rep., Chicago Pneumatic Tool Co., Chicago.
William L. Rudin, Foundry Met., Universal Castings Corp., Chicago.
Cecil F. Semrau, Illinois Malleable Iron Co., Chicago.
Clifford L. Wheeler, Asst. Mgr., Foundry, Dodge Chicago Plant, Div. Chrysler Corp., Chicago.
John Wicker, Apprentice, Washburne Trade School, Chicago.
Stanley John Woods, Patt, Engr., Industrial Pattern Works, Chicago.

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Allan A. Walker, Molding Foreman, The Detroit Steel Casting Co., Detroit.
E. George Wanamaker, Service Engr., City Pattern Foundry & Machine Co., Detroit.
Phillips Webb, Ind. Engr., Aluminum Co. of America, Detroit.

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Siegel B. Davis, Instructor, Saginaw Board of Education, Saginaw, Mich.
H. W. Dove, Div. Supt., Dow Chemical Co., Bay City, Mich.
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Kenneth Fiebig, Foreman Pattern Shop, Baker-Perkins, Inc., Saginaw, Mich.
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Julian J. Hubble, Gen. Foreman, Chevrolet Grey Iron Foundry, Saginaw, Mich.
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Harold F. Mitchel, Chief Engr., U. S. Graphite Co., Saginaw, Mich.
Kenneth E. Nelson, Laboratory Tech., Dow Chemical Co., Midland, Mich.
Wm. A. Nelson, Core Room Foreman, Buick Mfg. Co., Flint, Mich.
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S. Cornell, Sand Tester, Canadian Car & Foundry Co., Ltd., Montreal, Quebec.
Stanley Dzervonka, Coremaker, Dominion Engineering Works, Lachine, Quebec.
Jean. M. Drolet, Coremaker, Dominion Engineering Works, Lachine, Quebec.
Alex. Fraser, Supt., Maritime Steel & Foundries, Ltd., New Glasgow, N. S.
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Jack Gargano, Coremaker, Dominion Engineering Works, Lachine, Quebec.
Norbert Goyette, Coremaker, Dominion Engineering Works, Lachine, Quebec.
R. Lacoste, Production Mgr., Canadian Car & Foundry Co., Ltd., Montreal, Quebec.
Romeo Leclaire, Molder, Dominion Engineering Works, Ltd., Lachine, Quebec.
***Lefebvre Foundries Ltd., Montreal, Quebec (Paul-Emile Lefebvre, Chief Engr.).**
Leo Lemyie, Molder, Dominion Engineering Works, Lachine, Quebec.
***Maritime Steel & Foundries Ltd., New Glasgow, N. S. (Scott Cameron, V.P-G.M.).**
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E. Pfeifer, Asst. Foreman, Canadian Car & Foundry Co., Ltd., Montreal, Quebec.
Harold Robb, Sales Service, Chamberlain Engineering (Canada) Ltd., Montreal, Quebec.
John Smith, Foreman, Dominion Engineering Works, Ltd., Lachine, Quebec.

METROPOLITAN CHAPTER

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Frederick H. Davis, Technical, American British Chemical Co., New York City.
Thomas Desomma, Inspection Supv., Eclipse-Pioneer Foundries, Teterboro, N. J.
John Englert Jr., Salesman, The Hanna Furnace Corp., New York City.
Fred E. Kasch, Met., American Type Foundries, Inc., Elizabeth, N. J.
T. W. Lippert, Editor, The Iron Age, New York City.
William J. Lynch, Supv. of Sand, American Steel Castings Co., Newark, N. J.
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Arthur C. Schmid, Sales Rep., Jos. Dixon Crucible Co., Jersey City, N. J.
W. I. Smith, Supv. of Standards, American Brake Shoe Co., Brake Shoe & Castings Div., Mahwah, N. J.

MICHIANA CHAPTER

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NORTHEASTERN OHIO CHAPTER

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Pearson Browne, Dist. Sales Mgr., Semet-Solvay Co., Cleveland.
John Carlson, Sales Engr., A. P. Green Fire Brick Co., Mexico, Mo.
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Steve Fedor, Foreman, National Bronze & Aluminum Foundry Co., Cleveland.
Wm. Gorman, Foundry Supt., Ohio Injector Co., Wadsworth, Ohio.
Mike Grego, Foreman, National Bronze & Aluminum Foundry Co., Cleveland.
Walter L. Hartner, Owner, Swissvale Pattern Co., Braddock, Pa.
Julius Kratovil, Foreman, National Bronze & Aluminum Co., Cleveland.
Samuel C. Lashutka, Foundry Engr., Monarch Aluminum Mfg. Co., Cleveland.
James S. McCulley, Night Supt., National Bronze & Aluminum Foundry Co., Cleveland.

NORTHERN CALIFORNIA CHAPTER

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Thurston G. McGuffick, Repr., Western Business Papers, Inc., San Francisco.
Walter H. Mikel, Columbia Steel Co., Pittsburg, Calif.
J. R. Stokes, Engr., Bethlehem S. B. Corp., San Francisco.
John C. Wickland Pattern Works, Oakland, Calif.
Randolph Wirth, Project Engr., Joshua Hendy Iron Works, Sunnyvale, Calif.

N. ILLINOIS & S. WISCONSIN CHAPTER

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Frank J. Savitski, Alum. Fdry. Supt., Ebaloy Foundries, Inc., Rockford, Ill.
L. D. Wienzeril, Magnesium Fdry. Supt., Ebaloy Foundries, Inc., Rockford, Ill.

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PHILADELPHIA CHAPTER

Francis G. Felske, Resinous Products & Chemical Co., Philadelphia.
Leo Sorensen, Foundry Supt., Janney Cylinder Co., Philadelphia.

QUAD-CITY CHAPTER

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***Carver Pump Co., Muscatine, Iowa (Millard K. Mills, Jr., Fdry. Sales Mgr.).**
Henry De Voogh, Melting Foreman, J. I. Case Co., Rock Island, Ill.
Warren W. Duffin, Foreman Pattern Dept., J. I. Case Co., Rock Island, Ill.
Bernard Larson, Core Room Foreman, J. I. Case Co., Rock Island, Ill.
***Minneapolis-Moline Power Implement Co., Moline, Ill. (F. H. Truckenbrod, Stores Dep't.).**
John S. Morrow, Ordnance Steel Foundry, Bettendorf, Iowa.
Albert R. Porske, Mill Room Foreman, J. I. Case Co., Rock Island, Ill.
August Stevens, Chief Foundry Inspector, J. I. Case Co., Rock Island, Ill.
Albert Stolzenau, Foundry Supt., Carver Pump Co., Muscatine, Iowa.

ST. LOUIS DISTRICT CHAPTER

Sylvester Earl Allen, Personnel Dir., National Foundry Co., St. Louis.
Charles Broz, Plant Supt., National Foundry Co., St. Louis.
***M. Holtzman Metal Co., St. Louis (H. Glasser, Sales Mgr.).**
Edward Holzer, Foundry Supt., National Foundry Co., St. Louis.
Frank J. Jost, Purchasing Agent, McQuay-Norris Mfg. Co., St. Louis.
Gordon E. Kohlbry, Service Engr., Laclede Christy Clay Products, St. Louis.
James H. Maddern, Sales Mgr., National Foundry Co., St. Louis.
George Morel, Foundry Engr., National Bearing Metals Corp., St. Louis.
E. G. Ohnsorg, Metallurgist, National Foundry Co., St. Louis.
Joseph M. Quinn, Purchasing Agent, National Foundry Co., St. Louis.
M. E. Stewart, Foundry Met., McQuay-Norris Mfg. Co., St. Louis.
H. C. Strothoot, Foundry Supt., McQuay-Norris Mfg. Co., St. Louis.
Thos. P. Welliever, Foreman, General Steel Casting Corp., Granite City, Ill.
Dorris W. Wilton, Gen. Mgr., National Foundry Co., St. Louis.
Robert E. Woods, Executive, M. W. Warren Coke Co., St. Louis.

SOUTHERN CALIFORNIA CHAPTER

Merlin D. McArthur, Prod. Mgr., Warman Steel Casting Co., Vernon, Calif.
Frank Pellegrino, Molder, Warman Steel Casting Co., Los Angeles.
Don E. Rich, Foundry Supt., Eld Metal Co., Los Angeles.
Lorenz Roth, Molder, Ampco Metal, Inc., West Coast Div., Burbank, Calif.

TEXAS CHAPTER

***Beaumont Cement Sales Co., Beaumont, Texas (X. R. Randall, Pres.).**
Vernon G. Brock, Salesman, Beaumont Cement Sales Co., Beaumont, Texas.
***Crow Iron Works, Edinburg, Texas (V. N. Crow).**
R. L. Gober, Dedman Foundry Machine Co., Houston.
Ralph B. Mumford, Office Mgr., McArdle Equipment Co., Houston.
A. B. Schiebel, Foundry Foreman, Crow Iron Works, Edinburg, Texas.
Bill Sutton, Gen. Mgr., Wilson Foundry & Machine Co., Houston.

TOLEDO CHAPTER

Clarence G. Crites, Sr., Dir. of Labor Relations, Unicast Corp., Toledo.
A. V. Fromm, Supt., American Brake Shoe Co., Toledo.
C. C. Gill, Foreman, Unitcast Corp., Toledo.
Ray Henry, Chemist, Unitcast Corp., Toledo.
Frank T. Kayser, Supt. of Prod. Control, Unitcast Corp., Toledo.
T. L. Ohls, Supt. Molding Dep't., Unitcast Corp., Toledo.
Ray Stephenson, Molding Foreman, Unitcast Corp., Toledo.
Paul L. Stone, Purchasing, Unitcast Corp., Toledo.
Emmett E. Thompson, Supt. of Pattern Dep't., Unitcast Corp., Toledo.
Richard H. Turner, Purchasing Agent, Unitcast Corp., Toledo.
R. C. Van Hellen, Prod. Mgr., Unitcast Corp., Toledo.

TWIN-CITY CHAPTER

Roy Joslyn, Foundry Mgr., Donovan Mfg. Co., St. Paul, Minn.
Edward C. Lampman, Prod. Mgr., Minneapolis Electric Steel Co., Minneapolis.
Andrew Michalov, Production Man, Minneapolis Electric Steel Co., Minneapolis.

WESTERN MICHIGAN CHAPTER

L. J. Haga, Ch. Met., Kaydon Engineering Corp., Muskegon, Mich.
W. A. Hallberg, Foundry Engr., Lakey Foundry & Machine Co., Muskegon, Mich.
***Traverse City Iron Works, Traverse City, Mich. (W. A. Royce, Jr., Vice-Pres.).**

WESTERN NEW YORK CHAPTER

Raymond T. Estes, Supt. Quality Control, Lancaster Malleable & Steel Corp., Lancaster, N. Y.
Jack W. Garner, Pratt-Letchworth Co., Buffalo, N. Y.
Alexander J. Macdonald, Asst. to Gen. Supt., Hanna Furnace Corp., Buffalo.
Capt. Manuel Ojeda, Engr. Officer, Chilean War Materials Factory, Buffalo.
Edward S. Pajak, Molding Foreman, Worthington Pump Machinery Corp., Buffalo.
Robert E. Reed, Supt., Dunkirk Foundries, Inc., Silver Creek, N. Y.
Otto W. Winter, Vice-Pres., Acme Pattern & Machine Co., Buffalo.

WISCONSIN CHAPTER

Richard Conrad, Research Dep't., Allis-Chalmers Mfg. Co., Milwaukee.
Peter De Laat, Foreman, Nash-Kelvinator Co., Kenosha, Wis.
Harold R. Erlien, Foundry Foreman, Sivyer Steel Casting Co., Milwaukee.
Gerald C. Felsecker, Process Met., Ampco Metal, Inc., Milwaukee.
Louis Hackl, Time Study Foreman, Allis-Chalmers Mfg. Co., Milwaukee.
Francis J. Jeske, Asst. Prod. Met., Ampco Metal, Inc., Milwaukee.
Michael R. Kudia, Process Monitor, Ampco Metal, Inc., Milwaukee.
Earl K. Loverud, Mgr., Falls Mfg. Co., Menomonee Falls, Wis.
Robert E. Maersch, Asst. Tech. Foreman, Ampco Metal, Inc., Milwaukee.
Milwaukee Public Library, Milwaukee.

OUTSIDE OF CHAPTER

M. J. N. Bartlett, Steel Foundry Foreman, B. B. & C. I. Railway, Ajmer (Rajputana) India.
C. J. Dowd, Messrs. Balmer & Down, Brisbane, Queensland, Australia.
Nicolau Filizola, Pres., Industrias Filizola S/A, Sao Paulo, Brazil.
Oswaldo Filizola, Commercial Dir., Industrias Filizola S/A, Sao Paulo, Brazil.
Charles W. Hayes, Purchasing Supv., University of Kentucky, Lexington.
***K. G. Luke Pty. Ltd., Melbourne, Victoria, Australia (W. Fisher).**
Charles Mellor, Mangng. Dir., Mellor-Goodwin S. R. L., Buenos Aires, Argentina.
J. C. Munn, Prod. Mgr., Pacific Steel Foudry Co., Portland, Ore.
***Pacific Steel Foundry, Portland, Ore. (A. D. Stout, Mgr.).**
Arturo Pacheco Rojas, Mgr., Ferrifun, Santiago, Chile.
Neil S. See, Dir., National Carbon-Eveready, S. A., Monterrey N. L., Mexico.
Roy Stephens, Owner, Stephens Hauling Service, Portland, Ore.
H. J. Swain, Principal, Sydney Technical College, Ultimo, N. S. W., Australia.
Major Jack Weston Wheeler, Consultant, Reynolds Metals Co., Springfield, Mass.
***Wilson Waratah Metal Co., Brisbane, Australia (H. H. Wilson).**
***Wood Bros. Thresher Co., Des Moines, Iowa (Chas. Whitman, Fdry. Supt.).**

N.F.F.S. Representatives On A.F.A. Committees

ON the invitation of the American Foundrymen's Association, Roy M. Jacobs, President of the Non-Ferrous Founders' Society, has recently appointed E. H. Holzworth, President of Frontier Bronze Corporation, Niagara Falls, N. Y., as an N.F.F.S. representative on the Executive Committee of the Brass and Bronze Division of A.F.A.

He has also appointed L. M. Nesselbush as their representative on the A.F.A. Cost Committee. Mr. Nesselbush, who is connected with the Falcon Bronze Company and a Director of the N.F.F.S., is also Chairman of the N.F.F.S. Cost Committee, which is at the present time devoting considerable attention to preparing a manual for nonferrous foundrymen to provide their members with first, the minimum requirements of (a) general accounting principles that must be followed and (b) cost finding methods to be employed.

Preliminary portions of the manual have been developed in order to attain the industry's maximum contribution to the war effort, to provide the data essential for better controls and profitable operations in the post-war period.

It is planned to have the second section of the manual, covering labor, materials, expenses and burden, in shape for final discussion at the next meeting, to be held in Philadelphia the middle of January. After final approval by the Cost Committee and the Board of Directors, the program will be made available to the membership.

The A.F.A. Cost Committee under the chairmanship of Ralph L. Lee, Grede Foundries Inc., Milwaukee, Wis., is working on similar lines, devoting its principal attention to developing recommended practices for cost accounting and cost finding in small foundries and shops.

As reported in an earlier issue of American Foundryman, the War Department presented Battelle Institute, Columbus, Ohio, the Ordnance Distinguished Service Award, in recognition of outstanding contributions to ordnance progress. This scene of the presentation ceremony shows (left to right) Clyde Williams, director of Battelle; Maj. Gen. C. T. Harris, Jr., Commanding General of the Aberdeen Proving Ground, and Dr. F. B. Jewett, chairman of Bell Telephone Laboratories and principal speaker at the occasion.

Cupola Research Steering Committee Holds Meeting

THE Steering Committee of the Cupola Research Project met in Detroit, October 27 and 28, for the purpose of studying in detail the various sections of the Cupola Operations Handbook. Each section of the Handbook, which has been sent to members of the General Committee and on which criticisms have been received, was discussed in detail. Criticisms received were considered individually at this meeting.

A chapter outline was laid out for the Handbook. Plans were made for reviewing and revising certain sections in connection with the criticisms received, and as developed at the meeting. Certain information was found to be desired and arrangements have been made to secure it.

After the meeting, the committee expressed the opinion that the overall view of the book, as received at the meeting, conveyed to them a picture which enthused them regarding the Cupola Operations Handbook. Members expressed themselves to the effect that they believed the book would not only be a fine addition to the literature of the foundry industry, but an exceedingly helpful book for cupola operators and supervisors.

CHAPTER OFFICERS

David Zuege
Sivyer Steel Casting Co.
Milwaukee, Wis.
Secretary
Wisconsin Chapter

J. H. Williamson
M. A. Bell Co.
St. Louis
Director
St. Louis Chapter

H. A. Deane
American Brake Shoe Co.
New York
Vice-Chairman
Metropolitan Chapter

J. R. Cochran
Sundstrand Machine Tool Co.
Rockford, Ill.
Vice-Chairman
No. Illinois-So. Wisconsin Chapter

J. A. Bowers
American Cast Iron Pipe Co.
Birmingham, Ala.
Director
Birmingham Chapter

H. B. Harvey
Indiana Foundry Corp.
Muncie, Ind.
Director
Central Indiana Chapter

J. F. Staver
Staver Foundry Co.
Virginia, Minn.
Director
Twin City Chapter

P. T. Bancroft
Republic Coal & Coke Co.
Moline, Ill.
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Quad City Chapter

Wm. W. Beiser
Reliance Foundry Co.
Cincinnati, Ohio
Director
Cincinnati Chapter

F. Ray Fleig
Smith Facing & Supply Co.
Cleveland, Ohio
Treasurer
Northeastern Ohio Chapter

E. C. Hoenicke
Foundry Div., Eaton Mfg. Co.
Detroit
Vice-Chairman
Detroit Chapter

Wm. F. Lange
Casting Service Corp.
LaPorte, Ind.
Director
Michiana Chapter

CHAPTER ACTIVITIES *News*

See page 29 for list of Chapter representatives whose reports of local activities appear in this issue.

NORTHEASTERN OHIO HONORS
National Officers and Past Chairmen

By Wm. G. Gude

NATIONAL Officers' and Past Presidents' Night was combined with the annual November tribute to members of the armed forces at the Nov. 9 meeting of the Northeastern Ohio Chapter. Approximately 150 members and guests participated in the affair at the Cleveland Club, with President Russell F. Lincoln, Russell F. Lincoln & Co., Cleveland, presiding.

Special guests were 10 convalescing war veterans from nearby Crile General Hospital; Lieut. Dean Chatlain, a discharged veteran decorated for bravery in Tunisia; Fred J. Walls, International Nickel Co., Detroit, and Vice-President of A. F.A.; Wm. W. Maloney, Business Manager of A.F.A.; and the past presidents of the N.E.O. group.

Speaking as an officer of the association, Mr. Walls urged foundrymen to take steps to interest young men in joining the industry and to offset the misleading publicity which has appeared in recent months concerning working conditions in the foundry. Mr. Maloney reviewed briefly the technical publications recently made available by the association, and praised the work of the hundreds of national committee members who have made possible this growing fund of practical foundry data. Lieutenant Chatlain gave a stirring account of the action in Tunisia leading up to his being wounded.

In his second speaker's role Mr. Walls discussed "Cupola Practice" with particular reference to carbon control and the factors affecting it. He listed the following as the principal items influencing carbon pickup: cupola design, fuel, metal charge, air, flux and cupola operation. Considering cupola design, it was stated that the circumstances which could be expected to result in high carbon in the resulting iron include a high stack, large tuyeres, high tuyeres and a large well, with position of the slag hole also a factor.

Fuel, likewise, contributes to high carbon when the coke is soft, when coke pieces are small for the same bed height, when the bed height is raised, or when the burning rate is increased. Chemistry of the coke also is a consideration, high volatile fuel developing increased carbon in the iron.

The metal charge affects carbon pickup from various standpoints, including the chemistry of the charge and condition of the scrap. Higher carbon results from an increase in size of the total charge and in the proportion of pig iron used. The speaker stated that high carbon generally is associated with a fluid slag, low carbon with a sticky slag. Conditions tending to develop low carbon include high velocity of the blast and high humidity in the introduced air, while the colder the blast the lower will be the carbon pickup.

In discussing cupola operation,

This group picture of a recent Western New York Chapter Meeting shows that the membership thoroughly approved of the presentation of special A.F.A. pins to the Chapter's five former chairmen, pictured above.

Mr. Walls recommended uniform tapping intervals and avoidance if possible of complete shutdowns. He also suggested close attention to obtaining uniformity in the weight, volume and surface area of charged materials.

Mr. Wall's informal presentation of his subject in which he invited discussion from the floor as the various points were considered, proved unusually effective.

W. E. Jones Speaks To St. Louis Group

By Chas. E. Rothweiler

THE 106 members and guests attending the November 9 meeting of the St. Louis District Chapter rose to their feet and gave a resounding vote of thanks to W. E. Jones, Ordnance Steel Foundry Co., Bettendorf, Iowa, and past Chairman of the Quad City Chapter, for his paper and slides on "Atmospheric and Washburn Risers."

At the outset, Mr. Jones requested the audience to refrain from asking technical questions, since he wanted it understood that he is a practical foundryman and that his paper and slides covered data from actual experiences in the Bettendorf plant. It was through the use of the above materials that appreciable savings in grinding and cutting off of the risers were effected.

A brisk discussion period followed the talk which was considered one of the best that the group heard during the past year.

N. J. Dunbeck Is Speaker At Philadelphia Meeting

By B. A. Miller

THE Philadelphia Chapter held its first meeting of the 1944-45 season October 13 at the Engineers' Club, Philadelphia. Over 100 members and guests answered the call of Chapter Chairman Robert Latham, Bethlehem Steel Co., Bethlehem, Pa., and an interesting program was arranged by E. C. Troy, Dodge Steel Co., Philadelphia.

The speaker of the evening was N. J. Dunbeck, Eastern Clay Products, Inc., Eifert, Ohio. Technical Chairman was John Howe Hall, General Steel Castings Corp., Eddystone, Pa. Mr. Dunbeck's subject was "How to Select a Bond Clay." His introductory remarks were on the formation of the various clays through the natural processes.

He outlined the various kinds of material that give strength or bond to foundry sand, viz: fire clays, the various kinds of bentonite and other binders, specifying the most popular bentonites to be western and southern bentonites.

He further stressed the necessity of being cost-minded when using various clays and binders, and he was emphatic in bringing to mind the inherent qualities of western bentonite which expands in a solution of water while southern bentonite contracts under a similar set-up.

Mr. Dunbeck also emphasized that, since the same reactions take place when using these bentonites in practice, good common sense should be exercised when choosing the right clay for the right application. The speaker also suggested the need of periodically testing clays for strength and sintering points. A lengthy discussion followed Mr. Dunbeck's talk.

Centrifugal Casting Is Chesapeake Topic

By E. J. Hubbard

JOHN PERKINS, Ford Motor Co. of Canada, Ltd., Windsor, Ontario, discussed in detail the development and application of centrifugal casting at the Chesapeake Chapter's October 27 meeting, held at the Engineers Club, Baltimore.

Mr. Perkins' talk was divided into three parts: die or permanent mold centrifugal casting both vertical and horizontal, dry or baked sand mold centrifugal casting, and green sand centrifugal casting. The use of splash cores was introduced into the permanent mold for vertical centrifugal casting, and in this manner erosion and sticking of the castings to the molds was eliminated in a particular vertical casting process employed by the Ford Motor Co.

The types, grades and mixtures of sand used for cores in the semi-centrifugal casting of gear blanks and sprocket gears were also discussed. In this case, a silica wash made of silica flour, bentonite and glutrin was sprayed on these green cores and the cores were then baked in a vertical core oven.

The speaker used slides to illustrate the great variety of castings which are being produced by the Ford Motor Co., using the centrifugal casting method.

(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

The October 13 Section Meetings, sponsored by the Wisconsin Chapter at the Schroeder Hotel, proved highly successful.

85 Members Attending Opening at Birmingham

By J. P. McClendon

EIGHTY-FIVE members of the Birmingham Chapter saw to it that the opening meeting of the 1944-45 season, held at the Tutwiler Hotel, Birmingham, got off to an auspicious start.

Dr. Jas. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, the Program Chairman, introduced R. G. McElwee, Vanadium Corp. of America, Detroit, the guest speaker. Mr. McElwee's subject, "High Carbon versus Low Carbon Iron," dealt with the inoculants now being administered to cast iron.

He said the use of inoculants has enabled foundrymen to improve the

physical properties of cast iron, and that it also has helped to eliminate the differences in hardness between the light and heavy sections of castings.

In answer to many questions of how and when the inoculant should be administered, Mr. McElwee brought out the fact that the benefits of the inoculants usually begin to break down after 10 minutes and seem to cease to exist in the iron after 25 minutes have elapsed. Therefore, the inoculants should be administered as near the final pouring stage as possible. He also emphasized the fact that inoculation can be made effective in high carbon as well as low carbon iron.

Before bringing the meeting to a close, Chapter Chairman J. T. Gilbert, Stockham Pipe Fittings Co., Birmingham, extended praise to the membership committee for the fine showing the committee has made in securing new members.

225 Hear Nathan Janco At Saginaw Valley

By J. J. Clark

TWO hundred and twenty-five members and guests of the Saginaw Valley Group of the Detroit Chapter journeyed to Frankenmuth, Mich., to attend the November 2 meeting at Fischer's Hotel.

Following the showing of an Army Signal Corps film, "Baptism of Fire," Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla., gave an illustrated talk entitled "Centrifugal Casting Methods."

The speaker described the three general methods of centrifugal casting of metals; namely, the true centrifugal, the semi-centrifugal, and the centrifuge type. Numerous slides were shown of the general design of the molds and of the castings produced from them. It was explained that the speeds of rotation for various jobs can be closely estimated from prepared charts, or by computation, based on dimensions, and that once a job has been set up, if conditions are kept constant, a very uniform casting production can be obtained.

Mr. Janco stated that the advantages of the centrifugal casting method are improved soundness and high casting yield, but that this method is not to be taken as a "cure-all." The economics involved often makes it impossible for certain jobs to be made in other than the common static mold.

According to the speaker, the usual metals cast by centrifugal methods included iron, steel, and copper alloys, but that there has been some very successful work with aluminum and magnesium.

In conclusion, a discussion of permanent metal mold materials took place, in which it was stated that alloy cast iron with a nodular graphite appeared economically best so far.

Carbon-Silicon Balance Discussed at Canton

By Nils E. Moore

CHAPTER Chairman K. F. Schmidt, United Engineering & Foundry Co., Canton, Ohio, presided at the Canton District Chapter's October 26 meeting.

R. G. McElwee, Vanadium Corp. of America, Detroit, was the principal speaker. In discussing "The Economics of the Carbon-Silicon Balance," Mr. McElwee stated that castings of high carbon content can possess high tensile strength by proper balance of silicon.

According to the speaker, carbon-silicon ratios present a complex problem when tensile strength and hardness qualities are specified and must be produced in castings possessing radically different design, cooling rates and section thickness. The outstanding merit of iron of high carbon lies in the very low shrinkage produced.

Ladle additions of ferro-alloys in proper balance and judiciously used enter the economic picture by elimination of faulty castings and rejects, and because of lower shrinkage by reduction of the number of risers necessary, thus making it possible to produce a larger number of castings per ton of iron.

Lt. R. E. Van Ness, Assistant Chief, Veterans Personnel Div., Ohio State Selective Service Headquarters, gave a timely coffee talk, "The Returning Veteran."

Glenn Price, a former "Cantonite," on leave from his post as Superintendent of Operations at the Tata Iron and Steel Div., Tin Plate Co. of India, contributed to the interesting meeting by his informal comments on India's present role in the foundry industry and her future possibilities.

Cincinnati Subject Is "Future Foundrymen"

By Jos. Schumacher

A. F. A. Vice-President Fred J. Walls, International Nickel Co., Detroit, was the guest speaker at the Cincinnati Chapter's November 13 meeting, held at the Engineers Club, Cincinnati.

In his subject, "Future Foundrymen," Mr. Walls pointed out that the future of the cast metals industry in the post-war era and in the decades to follow is dependent upon the leadership which the industry receives and upon the ability of its workmen. The immediate post-war situation with regard to leadership and labor, said Mr. Walls, presents less of a problem that will arise in the distant future.

One of the most crucial problems which the cast metals industry faces at present, he said, is lack of competent manpower. He pointed out that it is necessary for the foundry industry to virtually launch a crusade toward creating public acceptance of the fact that a progressive foundry is a clean, safe and profitable place in which to work. Thus, the foundry industry will attract the proper type and quality of manpower required for future progress.

Those who heard the talk were of the opinion that the information presented should serve as a basis for future work to be undertaken by the Chapter, in giving local support to the national program of "selling" foundry careers to students.

W. B. George Talks at Opening Texas Meeting

By Harry Wren

THE September 14 meeting of the Texas group, held at Bill William's Restaurant, Houston, was designed to be of particular interest to non-ferrous foundries.

W. B. George, R. Lavin and Sons,

Inc., Chicago, was guest speaker, and in his talk he brought out many interesting points on the cost of castings and general foundry practice. A lively discussion period followed.

1944-45 Season Begins For Southern California

By R. H. Hughes

CHAPTER President W. D. Bailey, Jr., Westlectric Castings, Inc., Los Angeles, called the first session of the 1944-45 season to order for the Southern California Chapter on September 22 at the Elks Club, Los Angeles.

After the various committee chairmen gave reports of the different chapter groups, Leonard Hoffsteter, Brumley Donaldson Co., presented a discussion on "Foundry Sands." The meeting was concluded with the showing of the popular motion picture, "Men of Fire."

Section Meetings Held By Wisconsin Chapter

By Walter Gerlinger

THE October 13 meeting of the Wisconsin Chapter, held at the Schroeder Hotel, Milwaukee, featured six sectional meetings: Gray Iron, Steel, Malleable, Pattern, Non-Ferrous, and Technical.

Thomas Barlow, Battelle Memorial Institute, Columbus, Ohio, was the speaker at the gray iron session, discussing "Cast Iron Specifications, Their Alternate Allowances, and Post-War Effect of These Conditions." J. V. Olle, Motor Castings Co., West Allis, Wis., served as Chairman.

The Steel section, with Chairman J. Ewens, Milwaukee Steel Div., Grede Foundries, Inc., Milwaukee, heard C. E. Westover, also of Grede Foundries, speak on "Methods of Time and Motion Study in Foundries."

"Synthetic Bonded Sand Versus Natural Bonded Sand" had two speakers: E. W. Claar, Eastern Clay Products Co., Eifort, Ohio, and G. W. Anselman, Goebig Mineral Supply Co., Chicago. Stephen Pohl presided as Chairman.

The Pattern section held a general open forum on "Pattern Equipment, with Construction Displays." Discussion leaders for the session were: R. Metzger, Nordberg Mfg. Co., Milwaukee; W. Schmidt, Giddings & Lewis, Fond du Lac, Wis.; A. Weberg, Belle City Malleable Iron Co., Racine, Wis.; H. Wade, Fairbanks-Morse & Co., Beloit, Wis., and P. Riedel, Production Pattern Co., Milwaukee, Wis. A. F. Pfeiffer served as chairman for the group.

Marvin Nevins, Ampco Metal, Inc., Milwaukee, the Chairman of the Non-Ferrous group, led the discussion on "Melting Practice and Various Types of Equipment," presented by speakers from Ampco Metal, Inc., Milwaukee, and the Ajax Furnace Co.

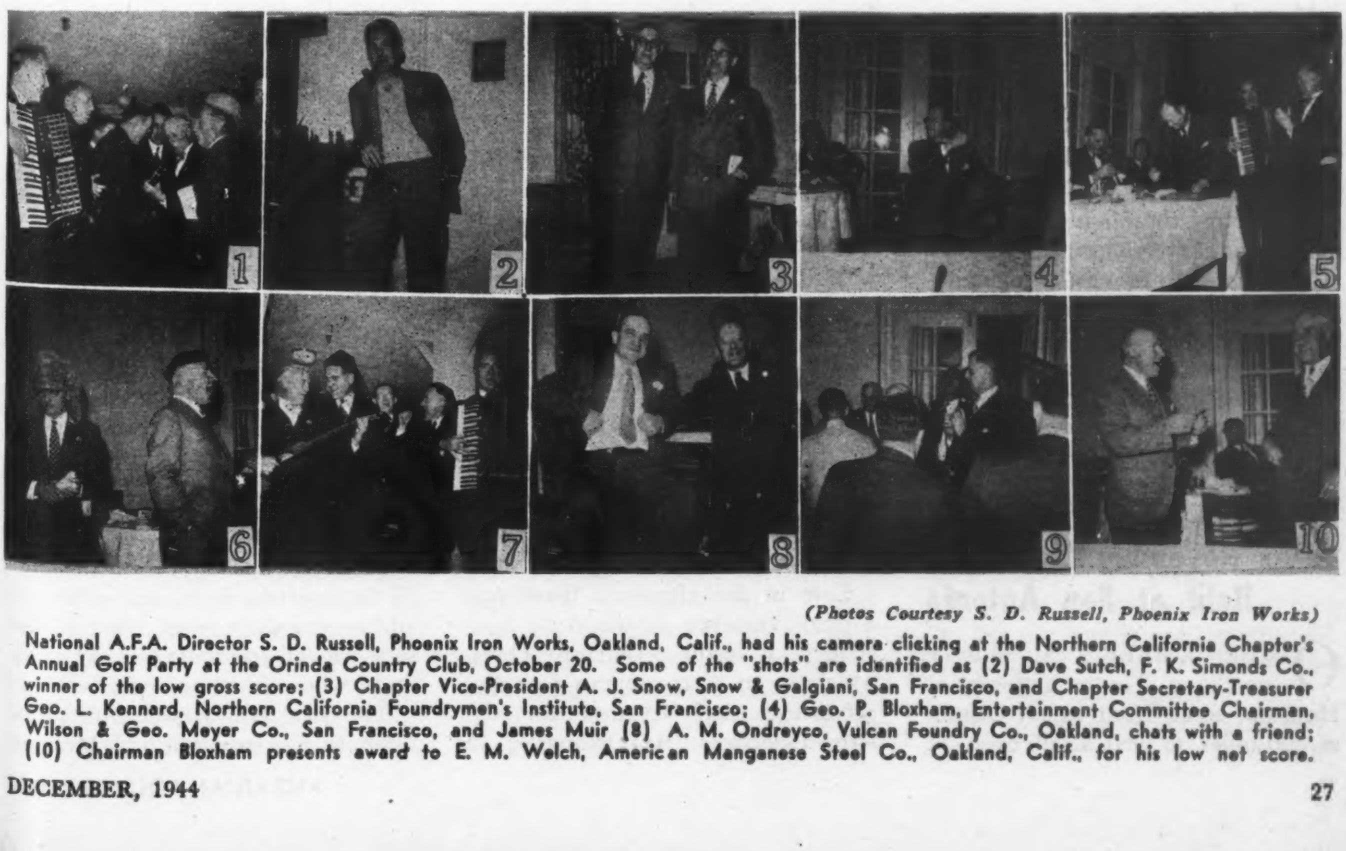
"Non-Destructive Tests for Soundness" was the subject for the technical session, under the chairmanship of Walter Punko. Two speakers were featured: Dale Trout, General Electric X-Ray Corporation, and C. D. Foster, Magnaflux Corp., Chicago.

E. W. Claar Speaks At Central New York

By John A. Feola

CHAIRMAN L. E. Hall, Syracuse Chilled Plow Co., Inc., Syracuse, N. Y., introduced E. W. Claar, Eastern Clay Products Co., Eifort, Ohio, to the 75 members and guests attending the Central New York Chapter's November 10 meeting at the Onondaga Hotel, Syracuse, N. Y.

In presenting his subject, "How to Select Bond Clay or Synthetic Sand in Small or Medium Foundries," Mr. Claar explained the physical



(Photos Courtesy S. D. Russell, Phoenix Iron Works)

National A.F.A. Director S. D. Russell, Phoenix Iron Works, Oakland, Calif., had his camera clicking at the Northern California Chapter's Annual Golf Party at the Orinda Country Club, October 20. Some of the "shots" are identified as (2) Dave Sutch, F. K. Simonds Co., winner of the low gross score; (3) Chapter Vice-President A. J. Snow, Snow & Galgiani, San Francisco, and Chapter Secretary-Treasurer Geo. L. Kennard, Northern California Foundrymen's Institute, San Francisco; (4) Geo. P. Bloxham, Entertainment Committee Chairman, Wilson & Geo. Meyer Co., San Francisco, and James Muir (8) A. M. Ondreyco, Vulcan Foundry Co., Oakland, chats with a friend; (10) Chairman Bloxham presents award to E. M. Welch, American Manganese Steel Co., Oakland, Calif., for his low net score.

At the opening Southern California meeting, special honor was paid to the men who have guided the destinies of the group as Chapter Presidents: (top view, left to right) Jas. E. Eppley, Kinney Iron Works, Los Angeles; Walter F. Haggman, Foundry Specialties Co., Huntington Park, Calif.; B. G. Emmett, Los Angeles Steel Casting Co., Los Angeles, and W. D. Bailey, Jr., Westlectric Castings, Inc., E. Los Angeles, current president. (Upper right) Leonard Hoffsteter, Brumley Donaldson Co., Los Angeles, guest speaker. (Lower photo) A view of the speakers' table.

characteristics of several clays and pointed out the properties to watch for in selecting a base sand. He then gave several illustrations when using these clays, either alone or in combination, to obtain molding sand of different physical properties.

Mr. Claar said that the clay is better distributed when scattered on top of the heap or over the top of the molds before they are dumped, and that it should always be added before the sand is tempered to prevent "balling." He also pointed out that the more thoroughly the sand is mixed, the more uniform it will be.

The speaker stressed the following advantages of synthetic sand over natural bonded sand: lower cost, more refractoriness, higher durability, less silt, and the fact that synthetic sand can be made to suit the requirements of several jobs.

Texas November Meeting Held at San Antonio

ON NOVEMBER 9 sixty of those roving Texans gathered at Houston, some from as far distant as 300 miles, to hear a talk by A. F. Gregg, Whiting Corp., Harvey, Ill.

Mr. Gregg gave a general discussion on cupola operation, converter operation, and mechanical charging for cupolas. He used some 30 slides to illustrate points of his discussion, and augmented the talk by showing a motion picture of the charging operation in use at the General Machine Co., Hamilton, Ohio.

F. M. Wittlinger, Texas Electric Steel Casting Corp., Houston, the Chapter Chairman, presided at the meeting.

Plant Tour Begins Season for Michiana

By John J. McAntee

THE opening meeting of the 1944-45 season was held by the Michiana Chapter at Hotel Whitcomb, St. Joseph, Mich.

Late in the afternoon there was a plant visitation at the Auto Specialties Riverside Defense Plant, which is an ultra-modern foundry, producing steel castings for the Armed Services. Approximately 75 members took advantage of the opportunity to make this interesting tour, which was directed by L. Krieger of the Auto Specialties plant.

The evening session began with dinner served to 168 members and guests at Hotel Whitcomb. The chapter was welcomed to the City of St. Joseph by its mayor, Waldo Tiscornia, Vice-President and Manager of all Auto Specialties plants.

J. A. Gitzen, Delta Oil Co., Milwaukee, talked on cores, the mixing of sand, baking, and evils of too much core oil. A concert by the Merrymen's Glee Club concluded the meeting, which was presided over by the Chapter Chairman, V. C. Bruce, Buckeye Products Co., Elkhart, Ind.

E. Canada & Newfoundland Features Group Meetings

By G. Ewing Tait

DISCUSSION meetings proved to be as popular as ever when the Eastern Canada and Newfoundland Chapter held its October 20 meeting at the Mount Royal Hotel, Montreal. This was the first of a series of group discussions planned for the year on iron, bronze and steel foundry practice.

The groups are under the chairmanship of E. C. Winsborrow, Canadian Car & Foundry Co. Ltd., Turcot Works; C. C. Brisbois, Robt. Mitchell Co. Ltd., and Ernest Tyler, Canadian Car & Foundry Co. Ltd., Longue Pointe Works. Each chairman has planned his program to cover the most important points for each type of foundry during the year.

The Chairman of the Program Committee, Arthur Cartwright, Robert Mitchell Co., Ltd., St. Laurent, Que., pointed out that one of the principal advantages of group discussions is the opportunity offered each member to individually contribute to the success and usefulness of the meeting as a whole.

He invited every member to participate in the discussions and a large proportion availed themselves of the opportunity to ask questions and present their views. In fact, the time was all too short to hear all of those who wished to speak.

The Steel Group concentrated on "Pattern Construction and Molding

Requirements," and there was much discussion on the question of proper shrinkage allowances and factors affecting the actual shrinkage of castings for which the pattern maker has to allow.

G. D. Turnbull, Canadian Car & Foundry Co. Ltd., Turcot Works, opened the Cast Iron discussion with an informative and practical talk on "Melting Practice and the Role of Raw Materials." This was followed by much discussion from members who had different methods of operating their cupolas.

The Bronze Group started out with "Molding and Core Sands" and covered the field of both natural and synthetic sands in non-ferrous foundries. The sand practice in several local foundries was outlined in detail and the effects of sand on foundry defects gone into.

Discussion leaders were W. J. Brown, Robert W. Bartram, Ltd., Montreal; J. C. Kinsella, Dominion Engineering Works, Montreal; H. Louette, Warden King Ltd., Montreal; H. W. Bennett, Dominion Engineering Works, Montreal; A. E. Cartwright, A. J. Moore, Montreal Bronze Ltd., Montreal; C. V. Hacker, Hull Iron & Steel Foundry Ltd., Hull, Que.; and Wm. Seeds, Western Pattern Works, Montreal.

Reports on Chapter Activities

Officers and representatives of A.F.A. chapter and other foundry groups who report on local activities in this issue, are identified below:

Birminghan—J. P. McClendon, Stockham Pipe Fittings Co., Birmingham; Chapter Reporter.

Canton District—Nils E. Moore, Wadsworth Testing Laboratory, Wadsworth, Ohio; Chapter Reporter.

Central New York—John Feola, Crouse-Hinds Co., Syracuse, N. Y.; Chapter Reporter.

Chesapeake—E. J. Hubbard, Koppers Co., Baltimore, Md.; Chapter Reporter.

Cincinnati—Jos. Schumacher, Hill & Griffith Co., Cincinnati; Chapter Secretary.

Detroit—H. H. Wilder, Vanadium Corp. of America, Detroit; Chapter Reporter.

Eastern Canada and Newfoundland—G. Ewing Tait, Dominion Engineering Works, Lachine, Que.; Chapter Vice-President.

Michiana—John McAntee, Covel Mfg. Co., Benton Harbor, Mich.; Chapter Director; C. W. Peterson, Dodge Mfg. Co., Mishawaka, Ind.; Chapter Director.

Northeastern Ohio—Wm. G. Gude, The Foundry, Cleveland; Chapter Reporter.

New England Foundrymen's Assn.—M. A. Hosmer, Hunt-Spiller Mfg. Corp., Boston; Group Reporter.

Philadelphia—B. A. Miller, Cramp Brass & Iron Founders Div., Baldwin Locomotive Works, Eddystone, Pa.; Chapter Director.

Rochester—D. E. Webster, American Laundry Machinery Co., Rochester, N. Y.; Chapter Secretary-Treasurer.

Saginaw Valley—J. J. Clark, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.; Chapter Reporter.

Southern California—R. H. Hughes, Almquist Bros. & Viets, Vernon, Calif.; Chapter Director.

St. Louis—C. E. Rothweiler, Hickman, Williams & Co., St. Louis; Chapter Secretary-Treasurer.

Texas—H. L. Wren, Beaumont Cement Sales Co., Houston; Chapter Reporter.

Toledo—G. W. Buchanan, Unitcast Corp., Toledo; Chapter Reporter.

Twin City—Alexis Caswell, Manufacturers' Association of Minneapolis, Inc., Minneapolis; Chapter Secretary-Treasurer.

Wisconsin—Walter Gerlinger, Walter Gerlinger, Inc., Milwaukee, Wis.; Publicity Chairman.

1944-45 Season Well Under Way in Twin City Chapter

By Alexis Caswell

A REGULAR meeting of the Twin City Chapter was held at the Leamington Hotel, Minneapolis, September 28. The speaker was L. H. Rudesill, Griffin Wheel Co., Chicago. Approximately 103 members and guests heard Mr. Rudesill speak on "The Fundamentals of Good Cupola Operation and the Selection of Melting Materials, Together with Their Effect on the Resultant Product."

Following the talk, a motion picture on "Venezuela" was presented.

October Meeting

L. P. Robinson, Werner G. Smith Co., Cleveland, was the speaker at the October 25 meeting, also held at the Leamington Hotel. Mr. Robinson selected for his topic, "Variables Which Affect the Baking of Cores." Questions were asked by many of the 110 members and guests present. The concluding feature of the evening was the showing of a sound film in technicolor, entitled "Ferrous Castings."

Roundtable Meeting Held at Michiana

By C. W. Petersen

A MOVING picture, "Action in Idaho," presented by the South Bend Bait Co., was greatly enjoyed by the many anglers present at the November 14 meeting held at the LaSalle Hotel, South Bend.

During the remainder of the evening two discussion groups considered foundry problems. One group, led by Martin J. Lefler, Strom Brass Foundry, Elkhart, discussed non-ferrous foundry problems. The second group, made up of gray iron foundrymen, discussed cupola problems under the leadership of I. S. Peterson, Premier Furnace Co., Dowagiac, Mich.

The non-ferrous group was much interested in possibilities of using commercial scrap in the brass foundry following the war, but was of the opinion that the difficulty of holding correct casting specifications with such material in the mixture was too great. The problem of reclaiming such scrap materials will have to be left with the smelters in the opinion of this group.

Another subject considered was the relative merits of heavy and light fuel oil. Some members of the group reported successful use of heavy oils by preheating at a considerable saving over light oils,

which are easier to use. There were also discussions on the importance of good ventilation in the brass foundry and on molding problems.

The discussion on cupola practice emphasized, among other things, the advantage of using mixing ladles to obtain more uniform mixtures, the importance of using steel and controlling the height of the coke bed in controlling carbons, the advantages of front slagging spout and the relative merits of cupola linings. On the subject of linings, the consensus seemed to be that monolithic lining material for patching the cupola has not yet proved as satisfactory as firestone or brick.

Detroit Makes Plans For National Meeting

By H. H. Wilder

THE November 16 meeting of the Detroit Chapter was held at the Rackham Educational Memorial, with 100 in attendance for dinner and succeeding round table conferences on brass melting, steel casting, and magnesium molding practice.

E. C. Hoenicke, Eaton Mfg. Co., Chapter Vice-Chairman and Program Director, presided and told of the organization of tentative chapter committees for the National A.F.A. Convention in Detroit, April 30-May 4. Comprehensive schedule of plant visitations, ladies' entertainment and other extracurricular affairs has been launched.

Round table on brass melting drew the largest crowd, 46 assembling to hear C. H. Knappenburger, Lava Crucible Co., discuss general considerations involved in preparation of brass heats in crucibles. J. P. Carritte, Jr., True Alloys, Inc., was chairman and a lively discussion developed with many participating.

Gordon Curtis of the Dodge Chicago Plant Division of Chrysler Corp., outlined essential details of a new inhibitor for use in preparation of molds for magnesium castings. About 25 asked questions and reviewed some of their own problems in this field.

Molds and cores for use in steel casting occupied the attention of the steel round table, with approximately 30 present. G. Vennerholm, Ford Motor Co., and an expert in the steel casting field, kept the discussion moving and outlined some of the procedures followed in Ford foundries.

New England Foundrymen Hear 'Personnel Relations'

By Merton A. Hosmer

"PERSONNEL Relations in the Coming Post-War Period" was the topic presented to the New England Foundrymen's Association October 11, meeting at the Engineer's Club, Boston.

Edward E. Kuypers, First National Stores, Boston, the speaker, outlined the rights and responsibilities of labor as well as management. According to Mr. Kuypers, management has the right to efficient work, to make a profit, to a loyal employe's service, and to conduct its business on a sound, honest basis.

In the same category, labor has a right to organize, to be represented by their own men, to impartial treatment, to good working conditions, to good supervision, to treatment as human beings, and to receive the same consideration and recognition as a machine would be given.

The speaker traced the progress of trade unions and explained why this progress was inevitable. He also made interesting predictions regarding personnel relations in the post-war era.

L. P. Robinson Talks At Rochester Meeting

By D. E. Webster

THE opening business meeting of the fall season was held by the Rochester Chapter at the University of Rochester, October 6. Following dinner at the Rush Rhees Cafeteria on the River Campus, the group met in the Geology Building to hear L. P. Robinson, Werner G. Smith Co., Cleveland, speak on "Variables in the Core Room—Their Treatment and Cure."

Points covered in the talk included the proper preparation of sands, the influence of baking cycles and oven temperatures, and the use of numerous binders. An interesting discussion period followed.

Toledo Chapter Discusses Centrifugal Casting

By G. W. Buchanan

THE first meeting of the 1944-45 season for the Toledo Chapter was held October 31 at the A.F.A. clubroom. Seventy-five members and guests were present.

Guest speakers were John Perkins, Ford Motor Co. of Canada, Ltd., Windsor, Ontario, and Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla., who talked on centrifugal casting. Both speakers used slides for illustration purposes.

Mr. Janco's talk dealt principally with the theory and general practice of centrifugal casting, while Mr. Perkins concentrated on the centrifugal casting process used in the foundry at the Ford Motor Co. of Canada.

It was disclosed that, in general, high yields are possible with centrifugal castings, and slides were shown of castings showing a yield of 90 per cent.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th St., New York, N. Y.

Aluminum

DESIGN. *"Yield Strength . . . Vital in Aluminum Design,"* Hiram Brown, LIGHT METAL AGE, September, 1944, vol. 2, no. 5, pp. 24-27.

The author defends the use of the yield strength and elongation as a basis for design of aluminum parts. Not only is the yield strength a more uniform value than the tensile strength of a material, but it may also serve as a quality control index to check chemical composition and heat treatment.

Aluminum-Base Alloys

EXAMINATION. *"Metallographic Examination of Aluminum Alloys,"* CANADIAN METALS AND METALLURGICAL INDUSTRIES, October, 1944, vol. 7, no. 10, pp. 40-41, 54.

Abstracted by METALLURGIA, August, 1944, from an article by N. H. Mason, G. J. Metcalfe and B. W. Mott, JOURNAL OF THE INSTITUTE OF METALS, May, 1944.

A description of the preparation of microscopic specimens of aluminum-base alloys, proper lighting for examination, the relation of microstructures to properties and various defects, and the appearance of structures accompanying failures from various causes.

Aluminum-Base Alloys

INSPECTION. *(See Radiography.)*

Brass and Bronze

MELTING. *"How to Melt Bronze,"* A. E. Cartwright, THE FOUNDRY, October, 1944, vol. 72, no. 10, pp. 85, 216, 218, 220.

The author discusses the order for adding elements during melting, care of crucibles, furnace atmospheres, and degasifying and fluxing practices.

Babbitt

LEAD-BASE. *(See Bearing Alloys.)*

Bearing Alloys

BABBITT. *"Casting Technique for Lead-Base Babbitt Alloys,"* R. G. Thompson, METAL PROGRESS, October, 1944, vol. 46, no. 4, pp. 739-742.

War-time restrictions have brought about a virtual substitution of lead-base for tin-base babbitt metals except in war implements. These have been found quite satisfactory, but the casting procedure is of the utmost importance with lead-base bearing alloys. The constituents of these alloys have considerably different densities and hence every effort must be made to reduce segregation to a minimum. This is of even greater importance in centrifugally cast bearings than in still-cast bearings. Low spinning speeds and rapid cooling are observed. For bonded bearings, the shell must be properly cleaned, fluxed, and precoated. Lead-base alloys form better bonds with steel shells than do tin-base alloys. They do not bond well, however, with bronze shells. Above 180° F. lead-base alloys are attacked by oils having a neutralization number higher than 1.0.

Brass and Bronze

TIN BRONZE. *(See Fluxes.)*

Castings

PRECISION. *"Industrial Precision Castings,"* Benjamin L. Levinson, THE IRON AGE, October 26, 1944, vol. 154, no. 17, pp. 82, 156, 158.

The author analyzes the dimensional tolerances obtainable on precision castings.

Centrifugal Casting

STEEL. *"Centrifugal Casting of Steel,"* S. D. Moxley, TRANSACTIONS OF THE A.S.M.E., October, 1944, vol. 66, no. 7, pp. 607-614.

A description of the various methods of centrifugal casting and the applications of each. The author also discusses types of centrifugal casting machines and the work for which they are best suited.

Chemical Analysis

SLAG. *"Rapid Routine Methods for Slag Analysis,"* Robert A. Willey, THE FOUNDRY, September, 1944, vol. 72, no. 9, pp. 87, 180, 182, 184.

Rapid and reasonably accurate methods of slag analysis.

Cleaning

LARGE CASTINGS. *"Core Removal,"* IRON AND STEEL, September, 1944, vol. 18, no. 14, p. 596.

A description of a machine which uses a pneumatically operated hammer and a drill which act in combination to quickly remove large cores, thereby reducing cleaning time.

Compressed Air

FOUNDRY USES. *"Efficient Utilization of Compressed Air in the Foundry,"* J. L. Yates, THE FOUNDRY, October, 1944, vol. 72, no. 10, pp. 80-81, 238.

In the past compressed air has contributed much to the making of better and cheaper castings. Consequently it is being used for an increasing number of foundry applications.

The efficient use of compressed air in a foundry is dependent upon the compressed air plant, the size and arrangement of air piping and the receiver layout, utilization of compressed air devices, and the proper maintenance of the entire compressed air system and the compressed air devices in use in the foundry.

Corrosion

CHEMICAL EQUIPMENT. *"Corrosion Experiences in Chemical Process Industries,"* Editorial staff report, CHEMICAL AND METALLURGICAL ENGINEERING, September, 1944, vol. 51, no. 9, pp. 94-100.

This article presents the views and personal opinions of a number of men concerning the use of various alloys in chemical process industries.

CHEMICAL EQUIPMENT. *"Directory of Metals,"* CHEMICAL AND METALLURGICAL ENGINEERING, September, 1944, vol. 51, no. 9, pp. 101-130.

A compilation of 374 alloys and their corrosion resistance in various corrosive media.

MAGNESIUM ALLOYS. *(See Magnesium.)*

Costs

GRAPHICAL ANALYSIS. *"Graphic Cost Analyses Guide Selection of Casting Method,"* PRODUCT ENGINEERING, July, 1944, vol. 15, no. 7, pp. 484-488.

The most economical method for producing any number of a given casting may readily be determined from graphical analyses. These analyses take into account not only the actual casting expenses but also machining costs and the effect of quantity on the costs.

Crucibles

CARE. *"Care of Crucibles,"* METAL INDUSTRY, October 13, 1944, vol. 65, no. 15, p. 230.

Hints on obtaining improved performance and life of crucibles.

Cupola

PRACTICE. *"Cupola Practice,"* Donald J. Reese, THE FOUNDRY, September, 1944, vol. 72, no. 9, pp. 79, 202, 204-206.

The size of charges is of the utmost importance in cupola operation. The author recommends that fuel charges be based on 7.5 pounds of coke per square foot of cupola area. Best cupola practice usually is attained when small fuel units are used.

In addition to accurately weighing the proper amounts of all materials, the materials should be of reasonable dimensions. The maximum linear dimension of materials should not exceed 30 per cent of the cupola diameter. Bed height should be that which will permit molten metal to accumulate at the tap hole 8 minutes after the blast is turned on. Blowers should be of sufficient capacity to provide enough air for above normal operation of the cupola.

Damping Capacity

TESTING. *"Damping Capacity of Metals,"* W. H. Hatfield, L. Rotherham, and E. M. A. Harvey, IRON AND STEEL, September, 1944, vol. 17, no. 14, pp. 613-618.

A previous paper on damping capacity of metals induced the authors to conduct further experiments and to discuss many of the factors which influence damping capacity. This discussion includes the effects of the following things: air resistance, air drag, long period of service, number of impulses applied, small changes of temperature, degree of reproducibility from the same bar, degree of reproducibility from different casts of the same material, variation of carbon content in steel, variation in chromium content in steel, variation in nickel content in steel, defects, cold work, and surface finish.

Design

ALUMINUM CASTINGS. *(See Aluminum-Base Alloys.)*

Electrical Alloys

MAGNETIC. *"Permanent Magnets,"* Werner Jellinghaus, IRON AND STEEL, September, 1944, vol. 17, no. 14, pp. 597-600.

A few years ago a quinternary alloy of iron, nickel, aluminum, cobalt, and copper was found to have the best permanent magnet properties ever obtained in an alloy. Heat treatment and tempering in a magnetic field imparted a preferred magnetic orientation to the alloy. This paper describes the investigation of alloys containing 23 per cent cobalt, 3 per cent copper, 15 per cent nickel, and aluminum between 5.7 and 16.6 per cents. Originally this report was published in the Archiv. fur das Eisenhuttenwesen.

Furnaces

TEMPERATURE CONTROL. *(See Electronics.)*

Electronics

FURNACE CONTROLS. *"Electronic Control for Resistance Furnaces,"* Harold J. Hague, STEEL, August 14, 1944, vol. 115, no. 7, pp. 106, 108, 162, 164, 166, 168, 170.

A description of a regulator system for accurately controlling the temperature in resistance-heater furnaces. The system includes a saturable core reactor, an electronic regulator, and a pyrometer with motor-operated rheostat of slide wire construction.

Fluxes

TIN BRONZE. *"Development of a Flux Degassing Process for Chill-Cast Tin Bronzes,"* W. T. Pell-Walpole, FOUNDRY TRADE JOURNAL, August 17, 1944, vol. 73, no. 1461, pp. 307-310, 312.

The author describes a series of experiments which were performed to develop a fluxing process which will meet the following requirements: (1) the flux must carry an easily dissociated oxide to prevent complete reduction from contaminating the bath; (2) the flux must be a solvent for oxides in the charge or formed during melting; (3) the flux should form a continuous layer over the bath at melting temperatures and should mix readily with the melt to facilitate fluxing reactions; (4) a suitable thickening agent must make the flux sufficiently pasty so that it may be readily removed before deoxidation; (5) enough deoxidizer should be added so that excess oxygen may be removed from the melt; and (6) the flux must be simple, easily prepared, cheap, not objectionably fuming, and should not attack the melting pot.

Gray Iron

CUPOLA PRACTICE. *(See Cupola.)*

Heat Treatment

REFRIGERATION. *"Subzero Treatment to Improve Tool Life,"* Stewart M. DePoy, METALS AND ALLOYS, September, 1944, vol. 20, no. 3, pp. 645-649.

In addition to assuring the complete transformation of austenite to martensite, the refrigeration of tool steels during hardening seems to prolong their life. It also brings about strain relief. The author discusses these phenomena and their possible causes.

Ladles

STOPPERS. *(See Refractories.)*

Magnesium

AIRCRAFT PARTS. *"Notes on Magnesium Alloy Applications in Aircraft and Allied Industries and on Alloy Compositions,"* G. Goddard, MAGNESIUM REVIEW AND ABSTRACTS, April, 1944, vol. 4, no. 2, pp. 35-44.

A discussion of the cast and wrought magnesium-base alloys in use in England, Germany, and America for aircraft parts.

CORROSION. *"Corrosion Behavior of Magnesium Alloys,"* H. M. Muncheryan, THE IRON AGE, September 7, 1944, vol. 154, no. 10, pp. 68-72.

Inclusions and impurities in magnesium-base alloys are responsible for much of the corrosion of these alloys. When such inclusions are present, even a good protective coating may fail to prevent corrosion. The author has described the microstructure of magnesium alloys, the effect of heat treatment on the structures, and the relation of structure to corrosion. He describes the mechanism of electrolytic corrosion of magnesium-base alloys and the manner in which corrosion may result from the presence of inclusions.

PLANNING CASTINGS. *"Planning Magnesium Casting,"* Oscar Blohm and M. D. King, LIGHT METAL AGE, September 19, 1944, vol. 2, no. 5, pp. 20-23.

Correct planning between the time that a blue print is first received and the time that a job emerges from the experimental stage is almost entirely responsible for the successful production of magnesium castings. The authors review the points which should receive careful study and consideration before a foundry undertakes to produce a casting.

X-RAY INSPECTION. *(See Radiography.)*

Molding Methods

PERMANENT MOLDS. *"An Outline of Gravity Die-Casting."* M. R. Hinchcliffe, FOUNDRY TRADE JOURNAL, August 3, 1944, vol. 73, no. 1459, pp. 269-273; August 10, 1944, vol. 73, no. 1460, pp. 293-297.

The outstanding advantages of permanent mold casting are greatly increased production rates, high dimensional accuracy, and improved mechanical properties. Zinc-base, aluminum or magnesium-base, and copper-base alloys are cast successfully on a commercial scale. The design of molds may be considered from three points of view: the manner of filling the mold with molten metal, the manner in which the metal solidifies, and the purely mechanical features of manipulating the mold and removing the solidified casting.

Radiography

MAGNESIUM. *"X-ray Control in the Magnesium Foundry,"* Robert Taylor, LIGHT METAL AGE, September, 1944, vol. 2, no. 5, pp. 30-31, 39.

Because of the nature of the most common defects which occur in magnesium castings, x-ray is admirably suited for inspecting magnesium castings. X-ray testing is, perhaps, of greatest value to the foundryman in eliminating defects and applying corrective measures. Among the defects found in magnesium castings are oxide inclusions, oxide folds, blows, metallic impurities, shrinks, cracks and large grain structure. The equipment needed to utilize x-ray inspection can be assembled very compactly and need not require a prohibitive amount of space in a small foundry.

Refractories

LADLE STOPPER HEADS. *"Stopper Heads X-rayed to Eliminate Pouring Trouble,"* Clyde B. Jenni, THE FOUNDRY, September 1944, vol. 72, no. 9, pp. 68-69, 208.

Defective stopper heads not only may be the cause of casting defects but also may be responsible for injury to persons working in pouring areas or in areas through which ladles of metal must be moved.

As insurance against these things, the author inspects stopper heads by means of low power x-rays. By this means it is possible to discover and reject defective stopper heads before they are put into use in a ladle.

Slag

ANALYSIS. *(See Chemical Analysis.)*

Steel

OPEN HEARTH CONTROL. *"Control of the Acid Open Hearth by Means of Slag Fluidity Test,"* G. R. Fitterer, THE IRON AGE, October 26, 1944, vol. 154, no. 17, pp. 62-63.

From a study of the reactions which occur in the open hearth furnace, the author concludes that a combination of a slag fluidity curve and a ternary $FeO-MnO-SiO_2$ diagram may be used as a control guide. Fluidity values may be used to indicate both the SiO_2 and FeO contents, as well as the temperature, providing the MnO content is known.

Schedule of December Chapter Meetings

December 1
Western New York
Hotel Touraine, Buffalo
WAYNE GUNSELMAN
National Bronze & Aluminum Co.
"Advantages of Aluminum Alloy"

✦ ✦

December 4
Metropolitan
Essex House, Newark, N. J.
NATIONAL OFFICERS NIGHT

✦

Texas
Rice Hotel, Houston
WARREN L. HUFF
"OPA Position Regarding Prices on Iron, Steel and Non-Ferrous Castings"

✦ ✦

December 5
Chicago
Terrace Casino, Hotel Morrison
OLD TIMERS NIGHT

✦

Michiana
La Salle Hotel, South Bend, Ind.
RALPH LEE
Grede Foundries, Inc.
"Costs and Cost Methods—Ferrous and Non-Ferrous"

✦ ✦

December 7
Saginaw Valley Section
Frankenmuth, Mich.
L. A. DANSE
General Motors Corp.
"Future of the Casting Industry"

✦ ✦

December 8
Northern California
Angelo's Restaurant, Oakland
T. W. FRANK
American Air Filter Co.
"Good Housekeeping"

✦

Ontario
Hotel London, London, Ontario
F. J. WALLS
International Nickel Co.
SPECIAL REGIONAL MEETING

Philadelphia
Engineers Club, Philadelphia
Gray Iron, Steel and Non-Ferrous
"Quiz the Expert"

✦

Southern California
Lakewood Country Club
ANNUAL CHRISTMAS PARTY

✦

Western New York
Hotel Touraine, Buffalo

✦

Wisconsin
Hotel Schroeder, Milwaukee

✦ ✦

December 9
Central Indiana
Athenaeum, Indianapolis
ANNUAL MID-YEAR PARTY

✦

Northern Illinois - Southern Wisconsin
Faust Hotel, Rockford, Ill.
CHRISTMAS PARTY

✦

Western Michigan Chapter
Springfield Country Club
CHRISTMAS PARTY

✦ ✦

December 14
Northeastern Ohio
Carter Hotel, Cleveland
CHRISTMAS PARTY

✦

St. Louis
DeSoto Hotel, St. Louis
CHRISTMAS PARTY

✦

Twin City
American Hoist & Derrick Co., St. Paul
FRED G. SEFING
International Nickel Co.
"A Study of Molding Methods"

✦

December 15
Eastern Canada and Newfoundland
Mount Royal Hotel, Montreal
HON. OMER COTE
Provincial Secretary
Province of Quebec
NATIONAL OFFICERS NIGHT

Quad City
Blackhawk Hotel, Davenport, Iowa
ANNUAL STAG

✦ ✦

December 16
Central New York
Onondaga Hotel, Syracuse, N. Y.
CHRISTMAS PARTY

✦

Rochester
Hotel Seneca, Rochester
J. H. VAN DEVENTER
IRON AGE
"Post-War Position of the Foundry Industry"

✦ ✦

December 19
Central Ohio District
Ft. Hayes Hotel, Columbus
R. G. MCELWEE
Vanadium Corp. of America

✦

Toledo
"Oilley's," Toledo
NATIONAL OFFICERS NIGHT
"Castings Defects"

✦ ✦

December 23
Cincinnati
Netherland Plaza Hotel, Cincinnati
CHRISTMAS PARTY

✦ ✦

JANUARY MEETINGS

January 2
Chicago
Chicago Bar Ass'n Restaurant
ROUND TABLE MEETING
Steel
"Acid Electric Melting"
Gray Iron
"Gating and Risering"
Non-Ferrous and Pattern Div.
"Non-Ferrous Patterns"
Malleable
"Furnace Operation and Melting Problems"

✦ ✦

January 4
Saginaw Valley
Frankenmuth, Mich.
C. E. BALES
Ironton Firebrick Co.
"New Development in Foundry Refractories"